

INSTRUCTION MANUAL
**MODELS 751A,
752A AND 753A
BRICKWALL FILTERS**

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SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

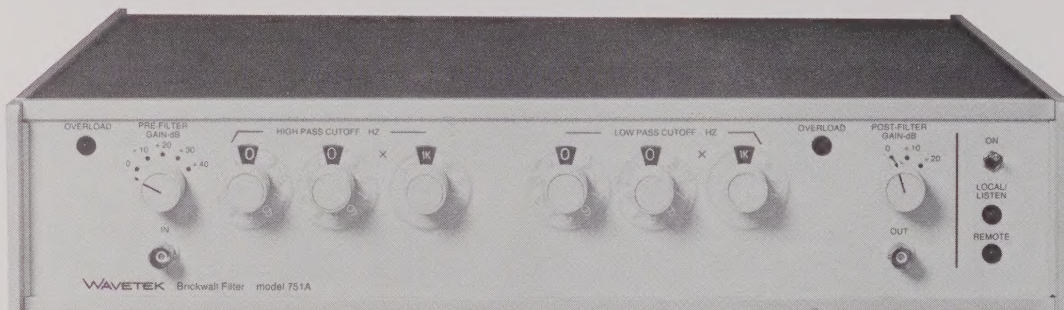
BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

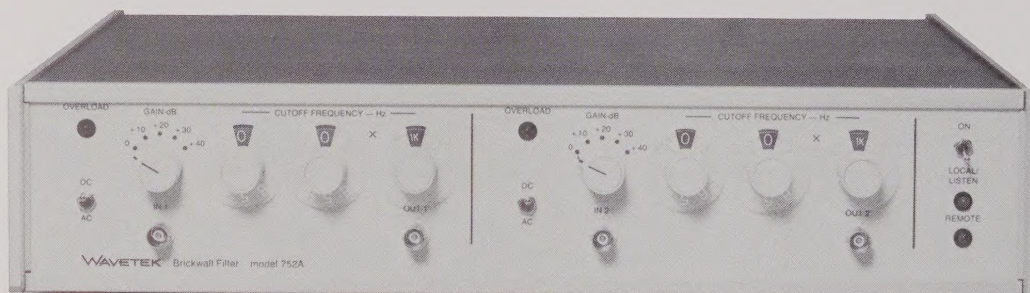
The instrument power receptacle is connected to the instrument safety earth terminal with a green/yellow wire. Do not alter this connection. (Reference:  or  stamped inside the rear panel near the safety earth terminal.)

WARNING notes call attention to possible injury or death hazards in subsequent operations.

CAUTION notes call attention to possible equipment damage in subsequent operations.



Model 751A. Brickwall Filter



Model 752A. Brickwall Filter



Model 753A. Brickwall Filter

1

SECTION GENERAL DESCRIPTION

1.1 INTRODUCTION

The Models 751A, 752A and 753A are programmable Brickwall™ Filters offering near-ideal passband and stopband characteristics.

The instruments employ 7th-order (7 poles and 6 zeroes) Elliptic or Causer filters with design values of 0.3 dB peak-to-peak passband ripple and 85 dB stopband attenuation. The transition from passband to stopband has a 115 dB/octave rolloff rate. For low pass response, the stopband is at $1.7 \times$ cutoff frequency; high pass response, the stopband is $0.6 \times$ cutoff for frequency.

The cutoff frequency may be programmed from 10 Hz to 99 kHz with 2-digit resolution and 1 Hz to 9 Hz with 1-digit resolution. Pre-filter, and (where available) post-filter gain may be programmed in 10 dB steps, up to the maximum available.

These instruments are extremely valuable in signal-processing applications for band-limiting prior to sampling to prevent aliasing, or for separating a narrow spectrum of interest from noise or other interfering signals. In addition to the extremely sharp filtering, they provide programmable low noise amplification for applications involving low-level signals and overload indicators to ensure operation within their linear dynamic range.

The basic differences of the three models are summarized here.

1.1.1 Model 751A is a single-channel band pass filter which consists of a high-pass section followed by a low-pass section. Low-pass and high-pass cutoff frequencies may be independently programmed. Prefilter gain, up to 40 dB, may be programmed, as well as postfilter gain, up to 20 dB. In addition, there are individual input and output overload indicators.

1.1.2 Model 752A is a dual-channel, low-pass filter. The two channels are amplitude-and phase-matched. They may be used independently, or cascaded for a rolloff rate of 230 dB/octave. Each channel has prefilter gain of up to 40 dB, input overload indicators and selectable ac/dc input coupling.

1.1.3 Model 753A is a dual-channel instrument which

consists of independent high-pass and low-pass sections. The two sections may be used independently, cascaded for band pass response, or paralleled for band reject response. Each section has prefilter gain of up to 40 dB and input overload indicators. The low-pass section has selectable ac/dc input coupling.

1.2 OPTIONS

Option 01 allows remote control of the filter using 35 lines of parallel BCD programming. Programming delay is 500 μ s plus filter settling time, which is a function of the programmed cutoff frequency.

Option 02 allows remote control of the filter using the IEEE 488-1978 (GPIB) interface. The interface includes the following functions: AH1 (Acceptor Handshake), L1 (Basic Listener with listen only), and DT1 (Device Trigger).

1.3 DEFINITIONS

The important low-pass characteristic of an Elliptic Filter is illustrated in Figure 1-1. The high-pass characteristic is the "mirror image" of the low-pass curve shown.

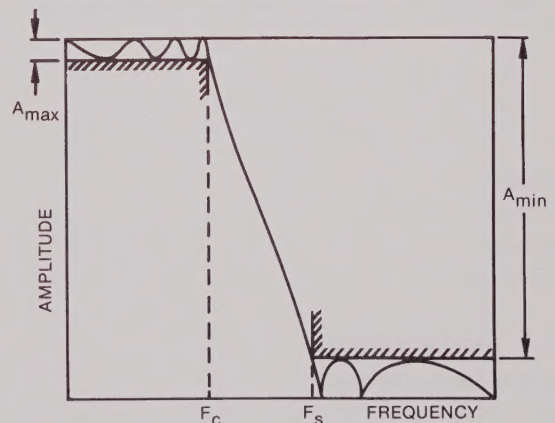


Figure1-1. Elliptic Filter Response

The Cutoff Frequency, F_C , is the frequency at which the response of the filter drops below the specified passband

ripple, $A_{\max}$. The conventional -3 dB frequency criterion has no significance in an elliptic filter.

For the low-pass section, F_s is the lowest frequency for which the specified stop-band attenuation ($A_{\min}$) applies. For the high-pass section, it is the highest frequency.

It should be noted that the low-pass and high-pass cutoff frequency tolerances of these instruments are intentionally "skewed" to slightly beyond their nominal values. That is, the high-pass cutoff frequency is slightly lower and the low-pass cutoff frequency is slightly higher than its nominal value. This ensures no data loss up to the F_c setting in the case of the 752A, or in the case of the 751A or 753A, when the two sections are set to identical cutoffs (minimum bandwidth) the slopes of the resulting response will not overlap and cause a passband amplitude loss.

1.4 SPECIFICATIONS

The following specifications apply to all models, except as noted.

1.4.1 Cutoff Frequency (F_c)

Range

1 Hz to 99 kHz with front panel and GPIB, 1 Hz to 100 kHz with remote control (BCD only).

Control (each channel)

Two 10-position switches, one 4-position multiplier switch; remotely by 12-bit code.

Resolution

Multiplier	Frequency (Hz)		Resolution of Setting (Hz)
	Local	Remote	
× 1	1-99	1-100	1
× 10	100-990	100-1k	10
× 100	1K-9.9k	1k-10k	100
× 1K	10K-99k	10K-100k	1k

Accuracy

-0.3 ± 0.1 dB at F_c .

Stability

± 200 ppm/ $^{\circ}$ C.

1.4.2 Gain (Prefilter)

Control (each channel)

One 5-position switch, or 3-bit code.

Steps

0, +10, +20, +30, +40 dB.

Accuracy

± 0.2 dB.

Gain (Postfilter)

Model 751A only

Control

One 3-position switch, or 3-bit code.

Steps

0, +10, +20 dB.

Accuracy

± 0.2 dB.

1.4.3 Filter Characteristics

Type

7-pole, 6 zero elliptic (Cauer).

Rolloff

115 dB/octave.

Passband Response

Low-pass channel: 0.3 dB p-p; High-pass channel: 0.3 dB p-p (-3 dB at approximately 400 kHz).

Stopband Attenuation

Low-Pass Channel	High-Pass Channel
-0.3 dB (dc to F_c)	-0.3 dB at F_c
-40 dB at $1.34 F_c$	-40 dB at $0.75 F_c$
-60 dB at $1.53 F_c$	-60 dB at $0.65 F_c$
-80 dB at $1.7 F_c$	-80 dB at $0.6 F_c$

Maximum Stopband Attenuation

Low-pass channel: 85 dB (typical); 80 dB (minimum) to 10 MHz. High-pass channel: 85 dB (typical); 80 dB (minimum).

Model 752A only

Amplitude Match*

± 0.1 dB, dc to $0.8 F_c$. ± 0.2 dB, $0.8 F_c$ to F_c .

Phase Match*

$\pm 1/2^{\circ}$ (typical). $\pm 1^{\circ}$ (maximum), dc to $0.8 F_c$. $\pm 1^{\circ}$ (typical), $\pm 2^{\circ}$ (maximum), $0.8 F_c$ to F_c .

1.4.4 Input Characteristics

Coupling

Low-pass channel: dc or ac with 0.3 Hz cutoff (nominal). High-pass channel: dc.

Impedance

1 M Ω 50 pF nominal.

Full Scale Signal

± 10 V at 0 dB gain; ± 100 V absolute maximum.

Equivalent Input Noise

-150 dBV/ $\sqrt{\text{Hz}}$ at +40 dB gain.

1.4.5 Output Characteristics

Impedance

50 Ω nominal.

Full Scale Signal

± 10 V into $R_L > 5k\Omega$.

Noise (1 MHz detector BW)

<80 dB below full-scale referred to output at any prefilter gain. (0 dB postfilter gain, 751A).

<10 μ V referred to input at 40 dB prefilter gain.

Harmonic Components

>80 dB below full-scale for 1 kHz input frequency.

Spurious Components

>80 dB below full-scale (includes line-related spurious).

Intermodulation Products

>70 dB below full-scale for 90 kHz and 70 kHz input frequencies.

DC Offset

Adjustable to 0 Vdc; $\leq \pm 10$ mV

Drift

± 50 mV (maximum), $+15^\circ\text{C}$ to $+40^\circ\text{C}$ at 0 dB gain setting.

1.4.6 General**Configuration**

Bench-top, convertible to rack-mounting.

Input/Output Connectors

Front and rear panel BNCs.

Accessories Supplied

Instruction Manual, Rack-mounting kit.

Temperature

0°C to $+40^\circ\text{C}$ for operation; -20°C to $+70^\circ\text{C}$ for storage.

Dimensions

43.2 cm (17 in.) wide; 8.9 cm (3½ in.) high; 33 cm (13 in.) deep.

Weight

8.2 kg (18 lb) net; 10.5 kg (23 lb) shipping.

Power

115/230 Vac $\pm 10\%$, 50 to 60 Hz, 25W.

1.4.7 Options**01 Parallel BCD Interface****02 GPIB Interface — (IEEE 488-1978)**

*Specifications apply when most significant cutoff digit is used; derate by a factor of 2 when both digits are used.



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SECTION 2

INITIAL PREPARATION

2.1 INSPECTION

After unpacking the instrument, visually inspect all external parts for possible damage to connectors, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the unit. The shipping container and packing material should be saved in case reshipment is required.

2.2 MECHANICAL INSTALLATION

The Models 751A, 752A, and 753A are designed for bench top operation or standard 19-inch RETMA rack mounting. Ambient temperature within the rack must not exceed + 40°C while the instrument is operating. The rear panel switches should be set before installing the filter in the rack.

2.3 ELECTRICAL INSTALLATION

2.3.1 Power Connection

The instrument will operate from either 115 or 230 Vac $\pm 10\%$, 50 to 60 Hz. The unit is shipped with the rear panel line voltage selector set for 115 V and a 1A SB fuse (see figure 2-1). To change the setting, insert a small-blade screwdriver in the switch slot and move switch to expose 115 for 115 Vac operation, or 230 for 230 Vac operation. For 230 Vac operation, change to a $\frac{1}{2}$ A SB fuse.

WARNING

In keeping with standard safety practice, the case of the instrument is grounded through the power cord. If the instrument must be connected to a two wire receptacle, use a parallel ground adapter and connect the short lead to ground.

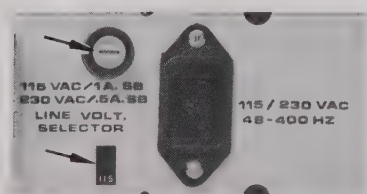


Figure 2-1. Voltage Selector and Fuse

2.3.2 Signal Connection

Use RG58U 50 Ω coaxial cables equipped with BNC connectors to distribute signals when connecting this instrument to associated equipment.

2.3.3 GPIB Option

2.3.3.1 GPIB Connection

The GPIB I/O rear panel connection is shown in figure 2-2; pin connections and signal names are given in table 2-1. The panel connector is an Amphenol 57-10240 or equivalent and connects to a GPIB bus cable connector (available from Wavetek in 1 and 2 meter lengths).

Table 2-1. GPIB Data In/Out

Pin	Signal	
1	DIO1	True When Low
2	DIO2	
3	DIO3	
4	DIO4	
5	EOI	True When High
6	DAV	
7	NRFD	True When Low
8	NDAC	
9	IFC	True When Low
10	SRQ	
11	ATN	True When Low
12	Chassis Ground (↯)	
13	DIO5	True When Low
14	DIO6	
15	DIO7	
16	DIO8	
17	REN	Signal Ground (↴)
18		
19		
20		
21		
22		
23		
24		

2.3.3.2 GPIB Address

For instruments on the General Purpose Interface Bus (GPIB), ensure that the GPIB address is correct. The GPIB address can be changed by the switch on the rear of the instrument (see figure 2-2) by simply setting the multiple section switch according to table 2-2. The switch sections are labeled from 1 through 5 and their open position noted (OPEN = Binary "0" in table 2-2).

Table 2-2. GPIB Address Codes

	ASCII		Switch Position					
Device	Listen	Talk	16	8	4	2	1	Listen (Hexadecimal)
1	(space)	@	0	0	0	0	0	20
1	!	A	0	0	0	0	1	21
2	"	B	0	0	0	1	0	22
3	#	C	0	0	0	1	1	23
4	\$	D	0	0	1	0	0	24
5	%	E	0	0	1	0	1	25
6	&	F	0	0	1	1	0	26
7	'	G	0	0	1	1	1	27
8	(	H	0	1	0	0	0	28
9	)	I	0	1	0	0	1	29
10	*	J	0	1	0	1	0	2A
11	+	K	0	1	0	1	1	2B
12	,	L	0	1	1	0	0	2C
13	—	M	0	1	1	0	1	2D
14	•	N	0	1	1	1	0	2E
15	/	O	0	1	1	1	1	2F
16	0	P	1	0	0	0	0	30
17	1	Q	1	0	0	0	1	31
18	2	R	1	0	0	1	0	32
19	3	S	1	0	0	1	1	33
20	4	T	1	0	1	0	0	34
21	5	U	1	0	1	0	1	35
22	6	V	1	0	1	1	0	36
23	7	W	1	0	1	1	1	37
24	8	X	1	1	0	0	0	38
25	9	Y	1	1	0	0	1	39
26	:	Z	1	1	0	1	0	3A
27	;	[	1	1	0	1	1	3B
28	<	\	1	1	1	0	0	3C
29	=	]	1	1	1	0	1	3D
30	>	↑	1	1	1	1	0	3E

NOTE

Address 31 is not allowed.

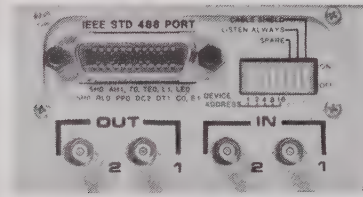


Figure 2-2. GPIB Address Selector Switch

2.3.4 BCD Option

The BCD I/O connector is a 50 pin connector; pin connections and functions are listed in table 2-3.

Table 2-3. BCD Interface Programming Connector All Models⁽¹⁾

Pin	Function	
1	× 1 Cutoff-Frequency Multiplier	True When Low Channel 1
2	× 10 Cutoff-Frequency Multiplier	
3	× 100 Cutoff-Frequency Multiplier	
4	× 1k Cutoff-Frequency Multiplier	
5	Cutoff-Frequency 1	
6	Cutoff-Frequency 2	
7	Cutoff-Frequency 4	
8	Cutoff-Frequency 8	
9	Cutoff-Frequency 10	
10	Cutoff-Frequency 20	
11	Cutoff-Frequency 40	
12	Cutoff-Frequency 80	
13	Gain 1	True When Low Channel 2
14	Gain 2	
15	Gain 4	
16	Overload	
17-22	Ground	
23	Load Command	
24	Ground	
25-26	Remote Enable	
27	Ground	
28	Load Command	
29-34	Ground	
35	Overload	
36	Gain 4 (Not used in Model 751A).	

**Table 2-3. BCD Interface Programming
Connector All Models⁽¹⁾ (Continued)**

Pin	Function	
37	Gain 2	} True When Low Channel 2
38	Gain 1	
39	Cutoff-Frequency 80	
40	Cutoff-Frequency 40	
41	Cutoff-Frequency 20	
42	Cutoff-Frequency 10	
43	Cutoff-Frequency 8	
44	Cutoff-Frequency 4	
45	Cutoff-Frequency 2	
46	Cutoff-Frequency 1	
47	× 1k Cutoff-Frequency Multiplier	
48	× 100 Cutoff-Frequency Multiplier	
49	× 10 Cutoff-Frequency Multiplier	
50	× 1 Cutoff-Frequency Multiplier	

⁽¹⁾For Models 751A/753A, Channel 1 = High pass filter section;
Channel 2 = Low pass filter section.

3.1 INTRODUCTION

This section describes how to operate the Models 751A, 752A, and 753A. Each model's controls and indicators are described. This is followed by typical operating procedures and response characteristics. Finally, the two interface options, BCD and GPIB, are discussed.

following figures and described in the following tables.

Model	Figure	Table
751A	3-1	3-1
752A	3-2	3-2
753A	3-3	3-3

3.2 CONTROLS AND INDICATORS

The front panel controls and indicators are shown in the

Rear panel controls for all three models are shown in figure 3-4 and described in table 3-4.

Table 3-1. Model 751A Controls and Indicators

Location in Figure 3-1	Function
1	OVERLOAD LED — When lit, indicates an input signal level of greater than $\pm 10V$ (including pre-filter gain).
2	PRE-FILTER GAIN — Sets the gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the cutoff frequency of the high pass filter, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the cutoff frequency of the high pass filter, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the cutoff frequency range of high pass filter, positions 1, 10, 100, and 1k.
6	Most Significant Digit — Sets the MSD of the cutoff frequency of the low pass filter; positions 0 to 9 with continuous rotation.
7	Least Significant Digit — Sets the LSD of the low pass filter cutoff frequency, positions 0 to 9 with continuous rotation.
8	Decimal Multiplier — Sets the low pass filter cutoff frequency range, positions 1, 10, 100, and 1k.
9	OVERLOAD LED — When lit, indicates an output signal of greater than $\pm 10V$ (including all filter gain).
10	POST-FILTER GAIN — Sets the gain from 0 to 20 dB in 10 dB steps.
11	ON switch — Turns the 751A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.

Table 3-1. Model 751A Controls and Indicators (Continued)

Location in Figure 3-1	Function
13	REMOTE LED — When lit, indicates the 751A is in the remote mode.
14	Output BNC connector.
15	Input BNC connector.

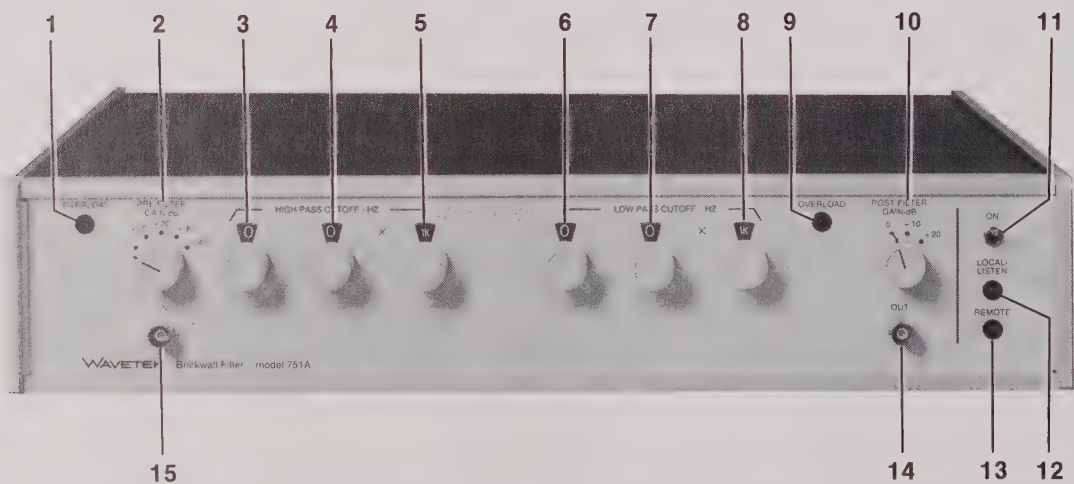


Figure 3-1. Model 751A Controls and Indicators

Table 3-2. Model 752A Controls and Indicators

Location in Figure 3-2	Function
1	OVERLOAD LED — When lit, indicates an input signal level to channel 1 of greater than $\pm 10V$ (including gain).
2	GAIN Channel 1 — Sets the input gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the Channel 1 cutoff frequency, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the Channel 1 cutoff frequency, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the Channel 1 cutoff frequency range, positions 1, 10, 100, and 1k.
6	OVERLOAD LED — When lit, indicates an input signal level to channel 2 of greater than $\pm 10V$ (including gain).
7	GAIN Channel 2 — Sets the input gain from 0 to 40 dB in 10 dB steps.
8	Most Significant Digit — Sets the MSD of the Channel 2 cutoff frequency, positions 0 to 9 with continuous rotation.
9	Least Significant Digit — Sets the LSD of the Channel 2 cutoff frequency, positions 0 to 9 with continuous rotation.
10	Decimal Multiplier — Sets the Channel 2 cutoff frequency range, positions 1, 10, 100, and 1k.
11	ON Switch — Turns the 752A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.
13	REMOTE LED — When lit, indicates the 752A is in the remote mode.
14	Channel 2 Output BNC connector.
15	Channel 2 Input BNC connector.
16	DC/AC Switch — Selects input coupling for Channel 2.
17	Channel 1 Output BNC connector.
18	Channel 1 Input BNC connector.
19	DC/AC Switch — Selects input coupling for Channel 1.

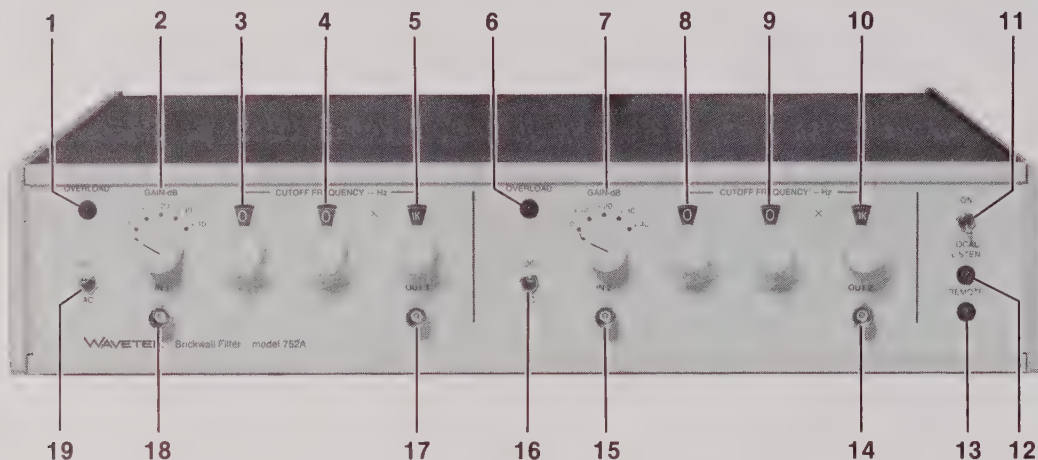


Figure 3-2. Model 752A Controls and Indicators

Table 3-3. Model 753A Controls and Indicators

Location in Figure 3-3	Function
1	OVERLOAD LED — When lit, indicates an input signal level to high pass filter of greater than $\pm 10V$ (including gain).
2	High Pass GAIN — Sets the input gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the high pass filter's cutoff frequency, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the high pass filter's cutoff frequency, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the high pass filter's cutoff frequency range, positions 1, 10, 100, and 1k.
6	OVERLOAD LED — When lit, indicates an input signal level to low pass filter of greater than $\pm 10V$ (including gain).
7	Low Pass GAIN — Sets the input gain from 0 to 40 dB in 10 dB steps.
8	Most Significant Digit — Sets the MSD of the low pass filter's cutoff frequency, positions 0 to 9, continuous rotation.

Table 3-3. Model 753A Controls and Indicators (Continued)

Location in Figure 3-3	Function
9	Least Significant Digit — Sets the LSD of the low pass filter cutoff frequency, positions 0 to 9 with continuous rotation.
10	Decimal Multiplier — Sets the high pass filter cutoff frequency range, positions 1, 10, 100, and 1k.
11	ON Switch — Turns the 753A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.
13	REMOTE LED — When lit, indicates the 753A is in the remote mode.
14	Low pass channel output BNC.
15	Low pass channel input BNC.
16	DC/AC Switch — Selects input coupling for the low pass channel.
17	High pass channel output BNC.
18	High pass channel input BNC.

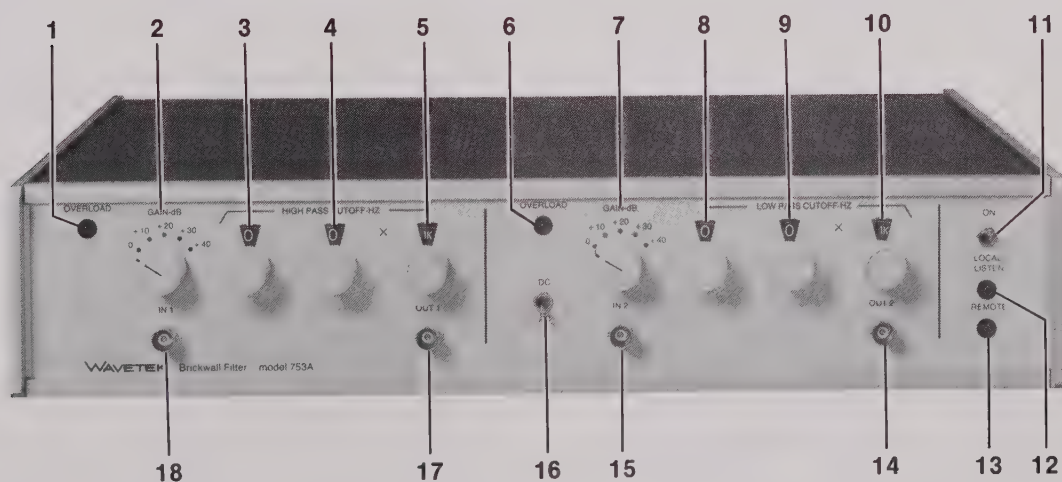


Figure 3-3. Model 753A Controls and Indicators

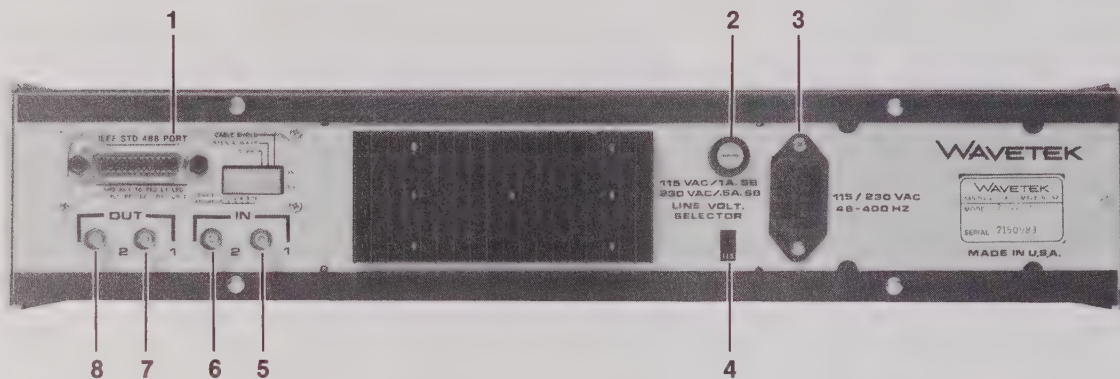


Figure 3-4. Models 751A, 752A, and 753A Rear Panel Controls

Table 3-4. Models 751A, 752A, and 753A Rear Panel Controls

Location in Figure 3-4	Function
1	Optional rear panel programming connector. Option 01: BCD interface 50 pin connector (not shown), see table 3-5 and paragraph 3.4. Option 02: GPIB interface connector, see table 2-1 and paragraph 3.5; GPIB address switch, see table 2-2 and paragraph 2.3.3.2.
2	Fuseholder, see paragraph 2.3.1.
3	Three-wire ac power connector.
4	115/230 Vac line selector switch.
5	Channel 1 input BNC connector parallels front panel BNC. Duplicate of item 6 for input on Model 751A.
6	Channel 2 input BNC connector.
7	Channel 1 Output BNC connector parallels front panel BNC. Duplicate of item 8 for output BNC on Model 751A.
8	Channel 2 Output BNC connector. Parallels front panel BNC.

3.3 TYPICAL OPERATING PROCEDURES

Always select the minimum decimal multiplier setting. For example, a cutoff frequency of 90 Hz can be set as 09×10 or 90×1 . The proper choice is 90×1 . In other words, the most significant digit of the cutoff frequency dials should not be set to 0, unless the cutoff frequency is less than 10 Hz. The minimum valid setting of Cutoff Frequency dials is 01. The setting 00 is not valid.

3.3.1 Model 751A

Passband

The passband of the filter extends from the high-pass cutoff frequency setting to the low-pass cutoff frequency setting. These, in turn, are determined by the two cutoff frequency dials and the corresponding multiplier switches.

The narrowest passband is obtained by setting high-pass and low-pass cutoff frequencies to the same value f_0 . In this case, the insertion loss is nominally 0 dB; the 3dB bandwidth extends from approximately $0.95 f_0$ to approximately $1.05 f_0$ and it is equal to $0.1 f_0$. This corresponds to a Q of 10. In this mode of operation, the instrument operates as a constant $-Q$ (or constant % - Bandwidth) filter.

Pre-Filter Gain

Pre-Filter gain may be selected to be 0, 10, 20, 30 or 40 dB. To maximize the useful dynamic range, the maximum gain should be used without causing the corresponding overload LED to light. Overload "On" indicates that an input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range and its frequency is within the passband of the filter, a ± 10 Volt A/D converter connected to the output of the 751A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is $\pm 10V$ (7.1 Vrms) for 0dB gain. When pre-filter gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is $\pm 1.0V$ (0.71 Vrms).

Post-Filter Gain

Post-Filter gain may be selected to be 0, 10 or 20 dB. This control should be set such that it does not cause the corresponding overload LED to light. Overload "On" indicates that the output signal has exceeded the maximum safe desirable amplitude and a ± 10 Volt A/D converter connected to the output of the 751A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

When Post-filter gain other than 0 dB is used, the dynamic range of the instrument is reduced by the amount of gain employed.

The primary use of Post-filter gain is when the instrument is being used with small (narrow) passbands; gain may be used to increase the amplitude of a small signal which was buried in broadband noise; or, it may be used to amplify noise, when the objective is to generate band-limited noise from a broadband noise source.

Response Characteristics

The following figures show examples of Model 751A typical response characteristics.

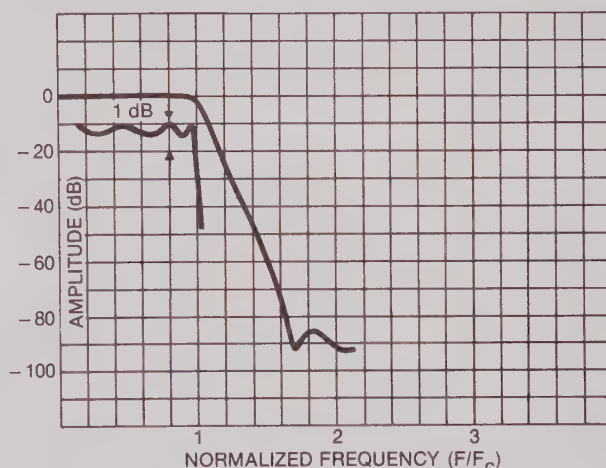


Figure 3-5. Model 751A Low-Pass Frequency Response

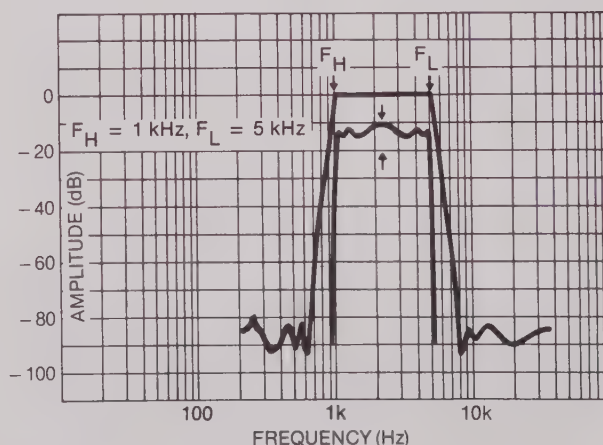


Figure 3-6. Model 751A Typical Bandpass Response

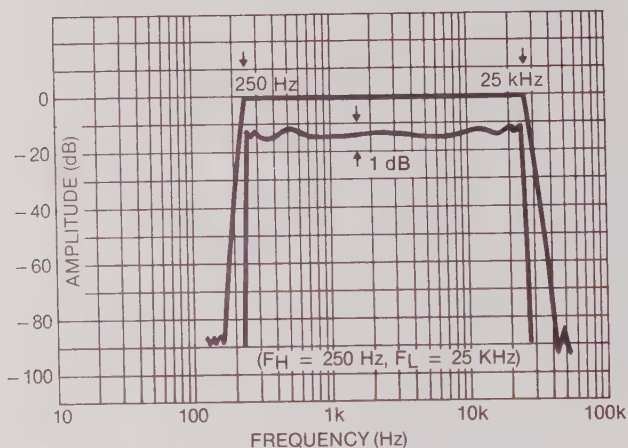


Figure 3-7. Model 751A Typical Bandpass Response

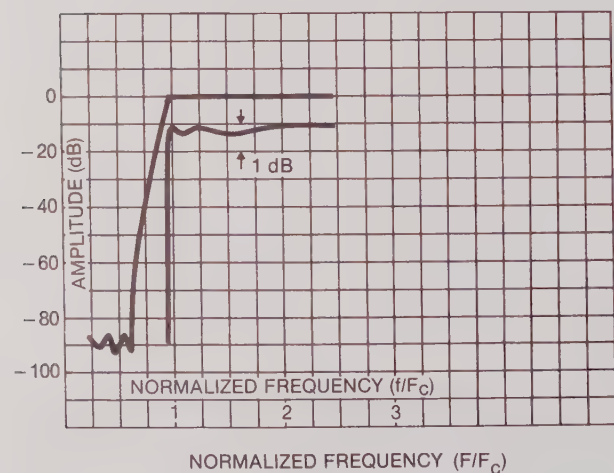


Figure 3-8. Model 751A High-Pass Frequency Response

3.3.2 Model 752A

Low-Pass Filter

The two channels of the instrument may be used independently to process two different input signals.

If the input coupling switch is set to DC, the passband of the filter extends from dc to the cutoff frequency which is defined by the cutoff frequency dials and the multiplier.

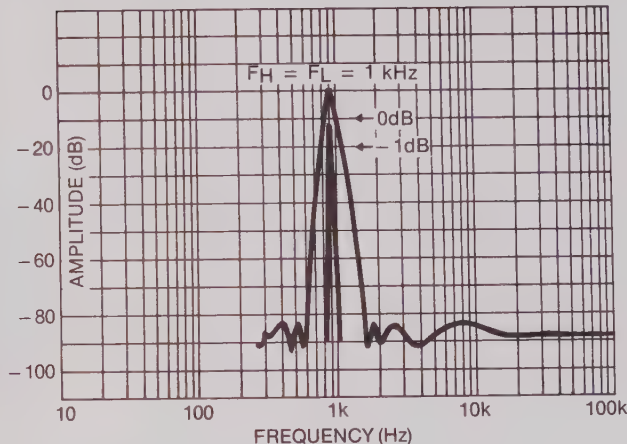


Figure 3-9. Model 751A Minimal Bandpass Response

Switching the coupling to AC causes a 6 dB/oct. rolloff below 0.3 Hz. This position should be used when large dc offsets are present in the input signal and response to dc is not required.

The passband gain of each channel may be selected to be 0, 10, 20, 30 or 40 dB using the Gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ± 10 Volt A/D converter connected to the output of the 752A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is $\pm 10V$ (7.1 Vrms) for 0dB gain. When gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is $\pm 1.0V$ (0.71 Vrms).

Low-Pass Filter with Doubled Rolloff

The two channels of the instrument may be cascaded by connecting the output of channel 1 to the input of channel 2. The cutoff frequency of both channels is set to the same value. Gain controls of both channels may be used. However, to maximize the usable dynamic range, the gain setting of channel 1 should be used before applying gain in channel 2. For example, if 50 dB gain is needed, set channel 1 to 40 dB and Channel 2 to 10 dB.

Response Characteristics

The following figures show examples of typical Model 752A response characteristics.

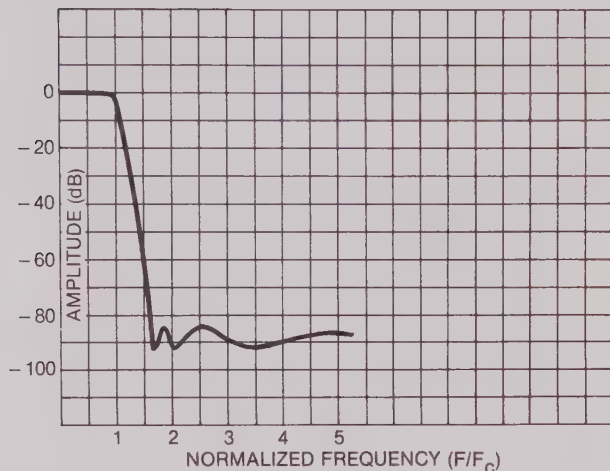


Figure 3-10. Model 752A Frequency Response

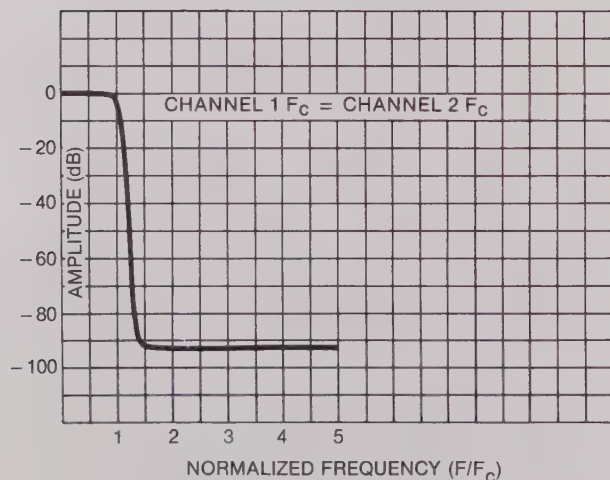


Figure 3-11. Model 752A Cascaded Channel Frequency Response

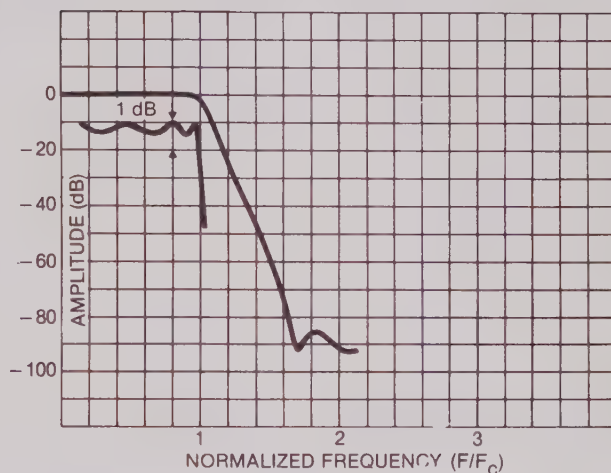


Figure 3-12. Model 752A Low-Pass Frequency Response

3.3.3 Model 753A

High-Pass Filter

The passband of the filter extends from the cutoff frequency setting to the upper 3 dB point of its active elements, which is around 400 kHz. The cutoff frequency is defined by the two cutoff frequency dials and the multiplier.

The passband gain may be selected to be 0, 10, 20, 30 or 40 dB using the gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ± 10 Volt A/D converter connected to the output of the 753A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is $\pm 10V$ (7.1 Vrms) for 0 dB gain. When gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is $\pm 1.0 V$ (0.71 Vrms).

Low-Pass Filter

If the input coupling switch is set to DC, the passband of the filter extends from dc to the cutoff frequency which is defined by the cutoff frequency dials and the multiplier.

Switching the coupling to AC causes a 6 dB/oct. rolloff below 0.3 Hz. This position should be used when large dc offsets are present in the input signal and response to dc is not required.

The passband gain may be selected to be 0, 10, 20, 30 or 40 dB using the gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ± 10 Volt A/D converter connected to the output of the 753A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is ± 10 V (7.1 Vrms) for 0 dB gain. When gain is employed, the maximum input signal decreases in proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is ± 1.0 V (0.71 Vrms).

Bandpass Filter

The two channels of the Model 752A may be cascaded by connecting the output of channel 1 to the input of channel 2 as shown in figure 3-13.

The passband of the filter extends from the high-pass cutoff frequency setting to the low-pass cutoff frequency setting. These are determined by the two cutoff frequency dials and the corresponding multiplier switches.

The narrowest passband is obtained by setting high-pass and low-pass cutoff frequencies to the same value, f_0 . In this case, the insertion loss is nominally 0dB; the -3 dB bandwidth extends from approximately $0.95 f_0$ to approximately $1.05 f_0$ and is equal to $0.1 f_0$. This corresponds to a Q of 10. In this mode the instrument operates as a constant $-Q$ (or constant % $-$ Bandwidth) Filter.

Gain may be selected in either, or both high-pass and low-pass sections. To maximize the useful dynamic range, the maximum gain should be used without causing the corresponding overload LED to light.

Band-Reject Filter

The two channels of the instrument may be connected in parallel by applying the input signal to both channels and summing the output signals, as shown in figure 3-14.

The rejection band of the filter extends from the low-pass cutoff frequency setting to the high-pass cutoff frequency setting. These are determined by the cutoff frequency dials and multiplier switches.

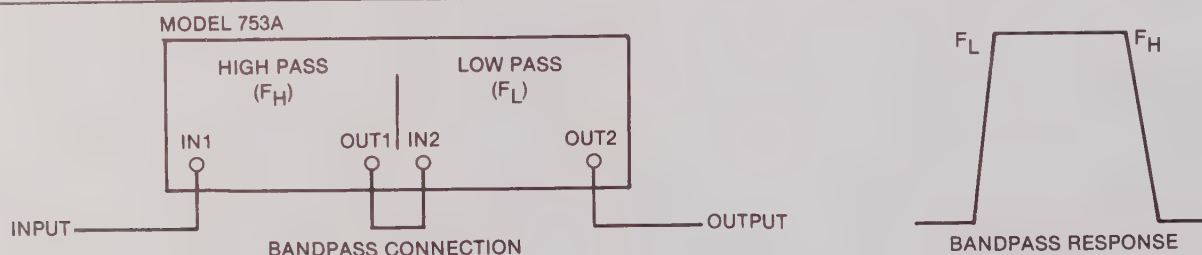


Figure 3-13. Band-Pass

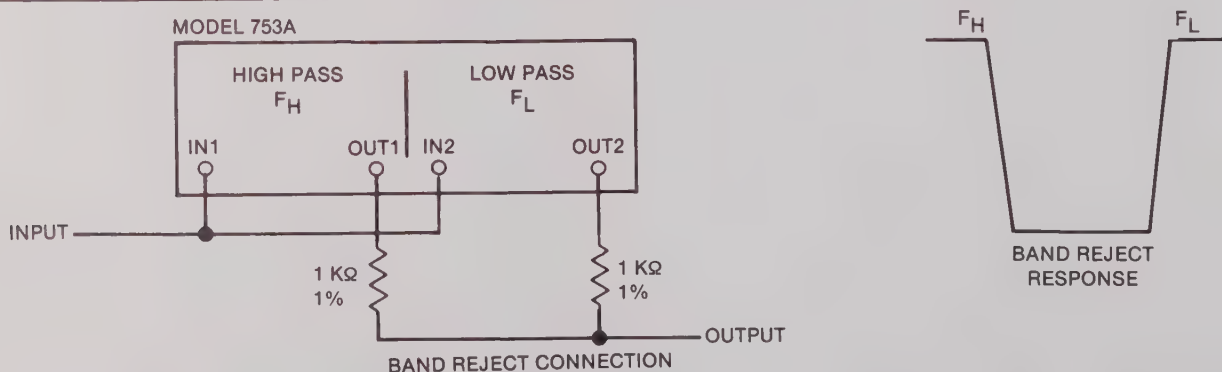


Figure 3-14. Band Reject

Because of the summation network at the output, this connection has an inherent 6dB insertion loss. If gain is necessary, both channel gains must be increased and set to the same value, when equal response outside the rejection band is desired. Unequal responses may be obtained by using different gains. For example, the low-pass side of the rejection band may be made higher in amplitude by setting the low-pass gain higher.

In either case, gain in the respective passbands will be 6dB less than the selected gain settings.

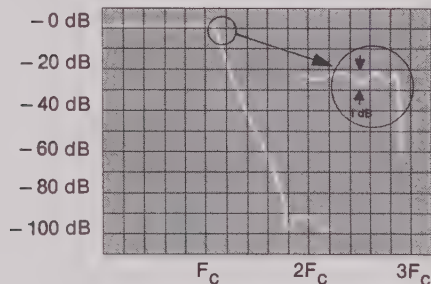


Figure 3-15. Low-Pass Response

A Notch response is a particular case of Band-Reject response. To obtain the minimum-width notch, set the low-pass cutoff at 59% and the high-pass cutoff at 167% of the desired notch frequency.

Response Characteristics

The following figures show examples of typical Model 753A response characteristics.

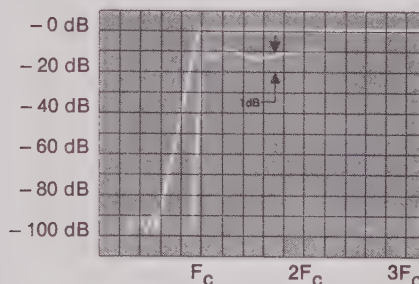


Figure 3-18. High-Pass Response

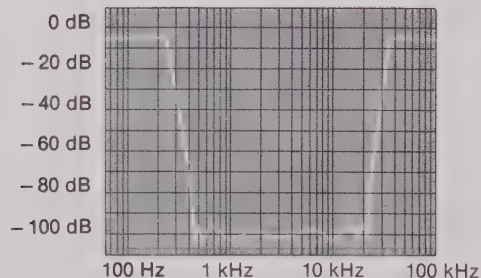


Figure 3-16. Band-Reject Response

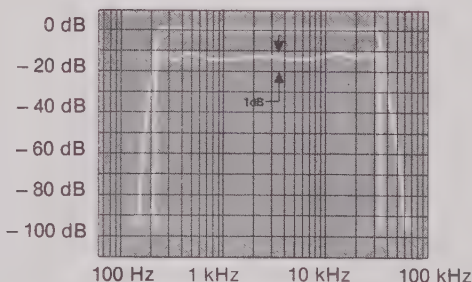


Figure 3-19. Pass-Band Response

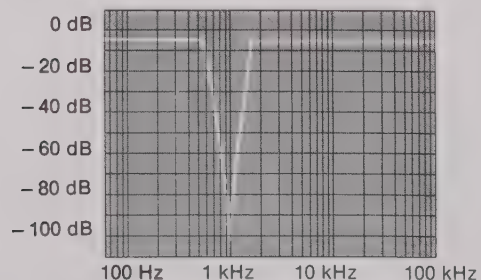


Figure 3-17. Minimum Band-Reject (Notch) Response

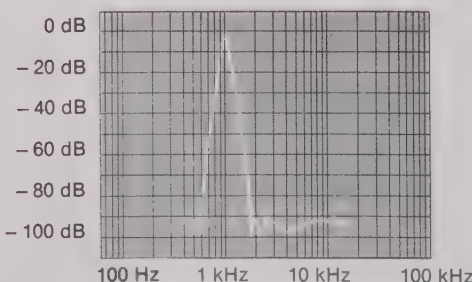


Figure 3-17. Minimum Pass-Band Response

3.4 REMOTE PROGRAMMING: BCD INTERFACE (OPTION 01)

A 50-pin connector is provided on the rear panel. Table

3-5 lists the pin connections and describes each signal. Remote programming inputs are low active ("1" State). A "1" is 0 V to 0.8 V, and a "0" is +2 V to +5 V.

Table 3-5. BCD Interface Programming Connector^(a)

Pin	Function	Description
1	× 1 Cutoff Frequency Multiplier	Low active. Selects the cutoff frequency multiplier for Channel 1.
2	× 10 Cutoff Frequency Multiplier	
3	× 100 Cutoff Frequency Multiplier	
4	× 1k Cutoff Frequency Multiplier	
5	Cutoff Frequency 1 Bit	Low active. Selects the units digits for the cutoff frequency for Channel 1 in 8, 4, 2, 1 binary code.
6	Cutoff Frequency 2 Bit	
7	Cutoff Frequency 4 Bit	
8	Cutoff Frequency 8 Bit	
9	Cutoff Frequency 10 Bit	Low active. Selects the tens digit for the cutoff frequency for Channel 1 in 8, 4, 2, 1 binary code.
10	Cutoff Frequency 20 Bit	
11	Cutoff Frequency 40 Bit	
12	Cutoff Frequency 80 Bit	
13	Gain 1 Bit	Low active. Selects the gain for Channel 1 in 4, 2, 1 binary code. Programmed as follows: 0 dB-000, 10 dB-001, 20 dB-010, 30 dB-011, 40 dB-100.
14	Gain 2 Bit	
15	Gain 4 Bit	
16	Overload	Low active. Indicates amplitude of input signal exceeds the maximum value in Channel 1.
17-22	Ground	
23	Load Command	Low active. Loads cutoff frequency and gain into the digital registers of Channel 1.
24	Ground	
25-26	Remote Enable	Low active. Disables front panel control of both channels and enables remote control.
27	Ground	
28	Load Command	Low active. Loads cutoff frequency and gain into the digital registers of Channel 2.
29-34	Ground	
35	Overload	Low active. Indicates amplitude of input signal exceeds the maximum value in Channel 2.
36	Gain 4 Bit ^(b)	Low active. Selects the gain setting for Channel 2 in 4, 2, 1 binary code. Programmed as follows: 0 dB-000, 10 dB-001, 20 dB-010, 30 dB-011, 40 dB-100.
37	Gain 2 Bit	
38	Gain 1 Bit	

Table 3-5. BCD Interface Programming Connector^(a) (Continued)

Pin	Function	Description
39	Cutoff Frequency 80 Bit	Low active. Selects the tens digit for the cutoff frequency for Channel 2 in 8, 4, 2, 1 binary code.
40	Cutoff Frequency 40 Bit	
41	Cutoff Frequency 20 Bit	
42	Cutoff Frequency 10 Bit	
43	Cutoff Frequency 8 Bit	Low active. Selects cutoff frequency multiplier for Channel 2.
44	Cutoff Frequency 4 Bit	
45	Cutoff Frequency 2 Bit	
46	Cutoff Frequency 1 Bit	
47	× 1k Cutoff Frequency Multiplier	Low active. Selects cutoff frequency multiplier for Channel 2.
48	× 100 Cutoff Frequency Multiplier	
49	× 10 Cutoff Frequency Multiplier	
50	× 1 Cutoff Frequency Multiplier	

(a) Applies to all Models except the 751A/753A, where “Channel 1” relates to the high pass controls; “Channel 2” relates to the low-pass controls.

(b) Not used in the 751A; Post-Filter Gain is limited to 20 dB.

3.5 REMOTE PROGRAMMING: GPIB INTERFACE (OPTION 02)

3.5.1 Introduction

The reader is assumed to be familiar with the IEEE 488-1978 standard. If not, a detailed description of the bus system and its parameters, IEEE STD 488-1978 is available from:

IEEE Standards
347 East 47th Street
New York, New York 10017

3.5.2 Device Address Code and Mode Select Switches

A row of eight miniature rocker switches on the rear panel sets the device address code and other operating modes.

3.5.2.1 Device Address Code Selection — Switches #1 through #5

The five left-most switches allow the selection of the device address in the system. The range of addresses is from 0 — 30 (decimal) corresponding to the ASCII characters “SPACE” through “>” see table 2-1.

The switches have binary weights of “1”, “2”, “4”, “8” and “16”. When the top edge of the rocker is pressed, the binary weight of that switch contributes to the address. When the bottom edge of the rocker is pressed,

that weight is off. For example, to set a listen address of 11 (decimal), the rocker switch pattern would be (left-to-right) on-on-off-on-off, or up-up-down-up-down.

3.5.2.2 Listen Always (Listen Only) Mode — Switch #6

The Listen Always (or Listen only) mode allows the instrument to only function as a listener. This eliminates the need for addressing the unit as a listener in simpler systems. When the Listen Always rocker switch is in the up (top depressed) position the Listen Always (Listen only) mode is selected. When this rocker switch is down (bottom depressed), the unit must be explicitly made a listener to receive data.

3.5.2.3 Shield Ground — Switch #8

When this switch is in the up position the shield of the IEEE Bus cable is electrically connected to the circuit ground of the instrument. When the switch is in the down position, the shield is not connected.

Use of this switch may be necessary in achieving optimum noise performance in a multi-instrument system.

3.5.3 Initialization

After power has been applied to all devices in the system, the Controller should:

1. Send REM (Remote Enable) active (low).
2. Send IFC (Interface Clear) active (low).

3. Send IFC (Interface Clear) inactive (high)

This will initialize all bus devices and set them to an idle state. Exercising the IFC line as above is also useful in reinitializing the system whenever it may be necessary. The instrument will assume the UNLISTEN state after this sequence.

3.5.4 Listen State

In order to receive data, the instrument must be in the LISTEN state, indicated by the LOCAL/LISTEN LED on the front panel. When in the LISTEN state, the unit handshakes and inspects all data sent over the bus. When not in the LISTEN state, the unit does not participate in the handshake and ignores data. Two methods are available for effecting the LISTEN state:

- 1. Sending the LISTEN command.
- 2. Setting the LISTEN ALWAYS switch on.

LISTEN Command

The LISTEN command is a universal bus command sent by the controller containing the address of the device to be affected. After sending this command, the green LISTEN LED on the front panel of the instrument should be lit.

LISTEN ALWAYS

If the rear panel LISTEN ALWAYS switch #6 is set to ON, then the first prefix character handshake cycle on the bus will place the instrument in the LISTEN mode, lighting the green LISTEN LED.

UNLISTEN STATE

If the LISTEN ALWAYS switch is OFF, the instrument will leave the LISTEN state if the universal command UNLISTEN or, IFC is issued or, power is removed. If the LISTEN ALWAYS switch is ON, the instrument will leave the listen state only if power is removed or IFC is issued.

3.5.5 Sending Data

All control and input data are sent in ASCII character format, which is prevalent in GPIB systems. When in the LISTEN mode, the instrument will handshake all characters sent over the bus, but only the characters in table 3-6 are meaningful to filters operation.

If any characters other than these are sent, the instrument will ignore them.

Channel Select Commands

To select the filter channel to be loaded, the character **C** must be sent followed by either:

- A for Channel 1 (or H — Models 751A/753A).
- B for Channel 2 (or L — Models 751A/753A).
- D for both Channels

For example, to select Channel 1 send:
CA

In order to make the string more intelligible to the user, extra characters may be inserted:

CH:A
CHNL = A

Table 3-6. ASCII Codes

ASCII Character	Function
A	Code for Channel 1; high pass (751A)
B	Code for Channel 2; low pass (751A)
D	Code for both Channels
G	Gain Digit Prefix
0,1,2,3,4,5,6,7,8,9	Data Value
F	Cutoff Frequency Digit Prefix
M	Cutoff Frequency Multiplier Prefix
C	Channel Select Prefix
CR	Carriage Return for Loading
GET	Group Execute Trigger for Loading

Frequency Digit Commands

The frequency digit is loaded by sending **F** followed by up to two digits between 0 and 99. For example, to send a frequency digit of 6, send:

F6

By inserting extra characters, the string can be more readable:

FREQ = 6
FREQ DIGIT: 6

Notice that both of these last examples contain the same key characters, F6. The other characters are simply ignored.

If more than two digits are sent, only the last two will be retained.

It is advisable never to send a frequency digit of 0 since this may cause a large dc offset to appear at the filter outputs.

Frequency Multiplier Commands

The frequency multiplier is treated like an exponent of 10. To enter the multiplier, send **M** followed by one digit from 0 to 3 which represents the power of ten of the multiplier. For example, M3 corresponds to a multiplier setting of $\times 1k$.

Any digit greater than 3 will be ignored and not loaded and if more than one digit is entered, only the last one will be retained if it is 3 or less.

By adding characters, alternate strings may be issued:

MULT = 3

MULT RANGE: 3

Gain Commands

The gain is loaded by sending **G** followed by 1 digit between 0 and 4 specifying the gain in multiples of 10 dB. For example, to set a maximum gain of 40 dB send:

G4

By inserting extra characters, the string can be more readable:

GAIN = 4

GAIN: 4

The type of filter gain used (i.e., Channel 1, Channel 2, Pre-filter or post-filter) is determined by the last channel select command that was sent over the system.

Notice that all these examples contain the same key characters "G4". The other characters are ignored. The maximum post-filter gain of the 751A's channel 2 is 20 dB (G2).

Terminator Commands

To terminate a digital value following a prefix character, send another prefix character (such as C, F, M, etc.), or CR or GET commands.

For example:

F28M.

The CR (Carriage Return) or GET (Group Execute Trigger) commands at the end of a command-value string loads the string into the instrument.

The GET command is a universal command the controller sends to initiate a simultaneously activity by more than one bus device. The interface interprets the GET command exactly as a CR character, causing loading of the data to the instrument.

Combining Commands

Channel number and gain commands may be entered in one ASCII string followed by a CR or GET which transfers all data simultaneously to the unit. The order of command is unimportant. If one or more of the commands is omitted, the last value entered will be retained (as long as power is maintained). If more than one occurrence of a command is present in a string, only the last one will be retained.

For example, to program Channel 2 with 60 kHz cutoff-frequency and 10 dB gain send:

CBF60M3G1 (CR)

Alternatives for the same parameters are:

F60M3G1CB (CR)

M3CBG1F60 (CR)

In addition, if the channel select, multiplier digit, and gain do not change from the previous entry but the frequency digit changes to 40, then it is only necessary to send:

F40 (CR)

Extra characters may be included for easier programming:

"CHNL = A, FREQ = 60, MULT = 3, GAIN = 1 (CR)"

4.1 INTRODUCTION

This section gives a functional description of the Models 751A, 752A, and 753A Brickwall filters. Following this is a detailed explanation of the seventh-order elliptic filter.

4.2 MODEL 751A

For the following description, refer to figure 4-1. The input signal is applied to a low-noise input amplifier with programmable gain (Prefilter gain) of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed $\pm 10 V_{pk}$ or $7V_{rms}$. This signal is applied to an active RC seventh order high pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The output of the high pass section is connected to an active RC seventh-order low pass elliptic filter. The high pass cutoff frequency is programmed the same as the low pass filter.

The high pass filters output is applied to an output amplifier with programmable gain (postfilter gain) of 0dB, 10 dB, or 20 dB. An overload detector at the output indicates when the output signal level exceeds $\pm 10 V_{pk}$ or $7V_{rms}$, which is the rated input for most A/D converters.

All filter parameters can be controlled by the front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.3 MODEL 752A

For the following description, refer to figure 4-2. The

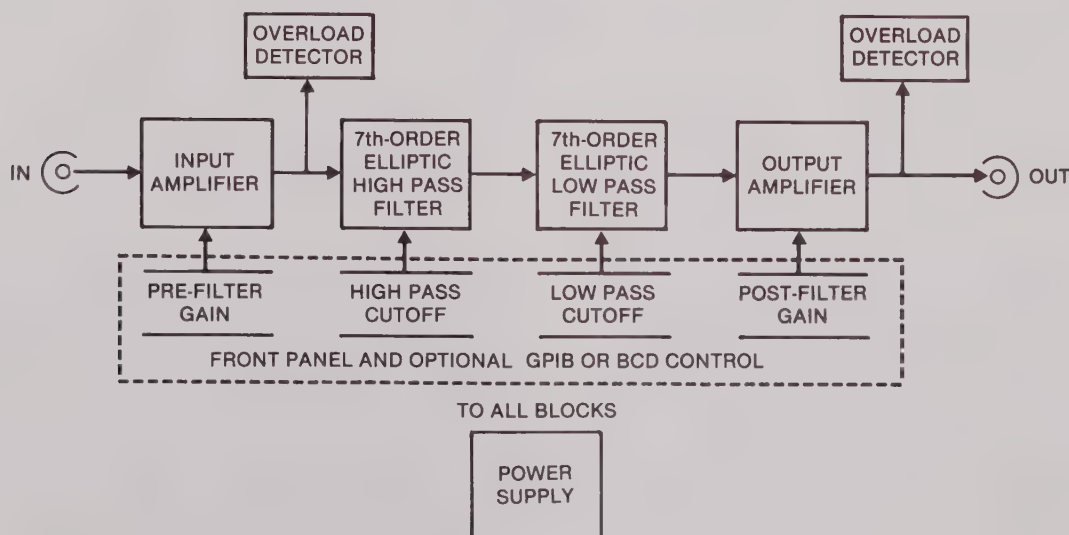


Figure 4-1. Model 751A Block Diagram

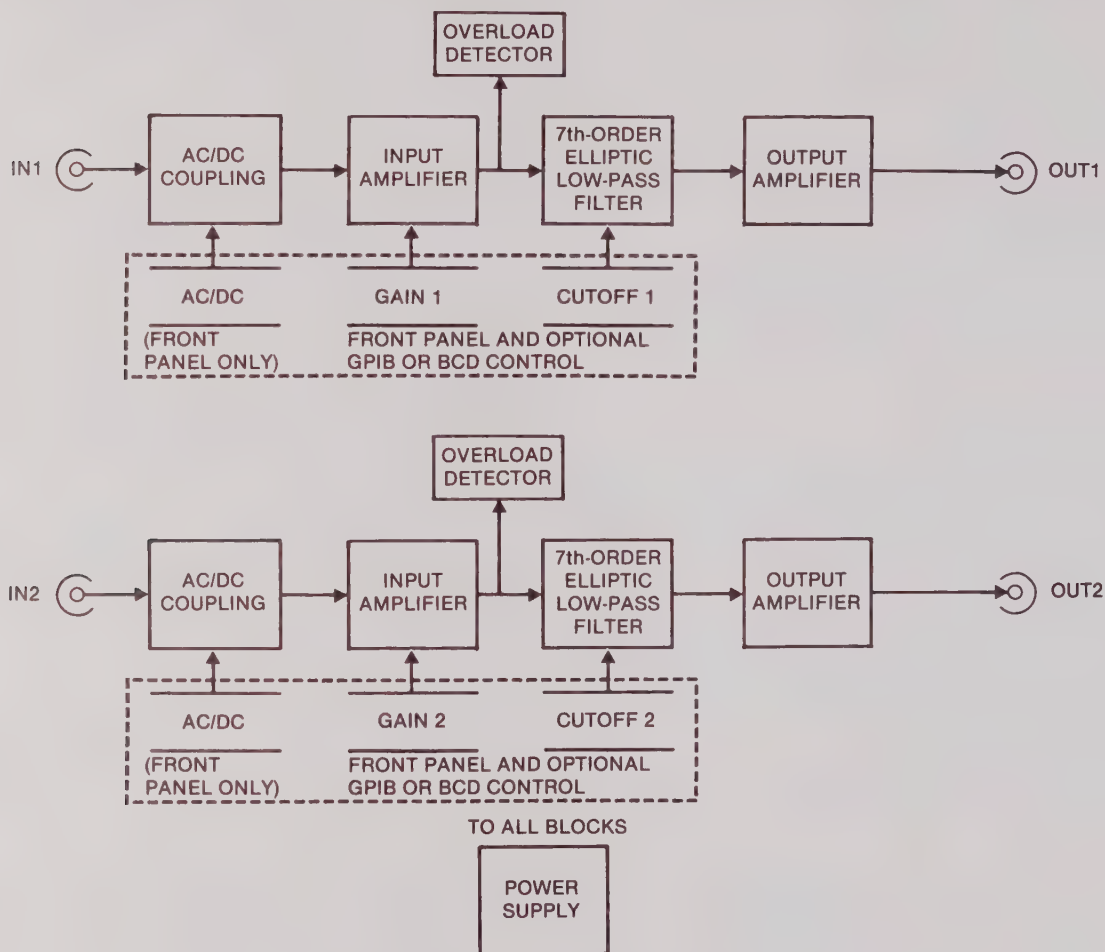


Figure 4-2. Model 752A Block Diagram

Model 752A consists of two identical, separate low pass filters which are amplitude and phase matched throughout the filter pass band. Since both channels are identical, only one channel will be described.

The input signal is applied through the AC/DC coupling switch (front panel control only) to the input of a low noise input amplifier with programmable gain of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed $\pm 10 V_{pk}$ or $7V_{rms}$. This signal is applied to an active RC seventh order low pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The low pass filter output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full scale output at $\pm 10 V_{pk}$ or $7V_{rms}$, which is the rated input of most A/D converters.

All filter parameters can be controlled by front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.4 MODEL 753A

For the following description, refer to figure 4-3. The Model 753A consists of a separate high pass filter (Channel 1) and low pass filter (Channel 2).

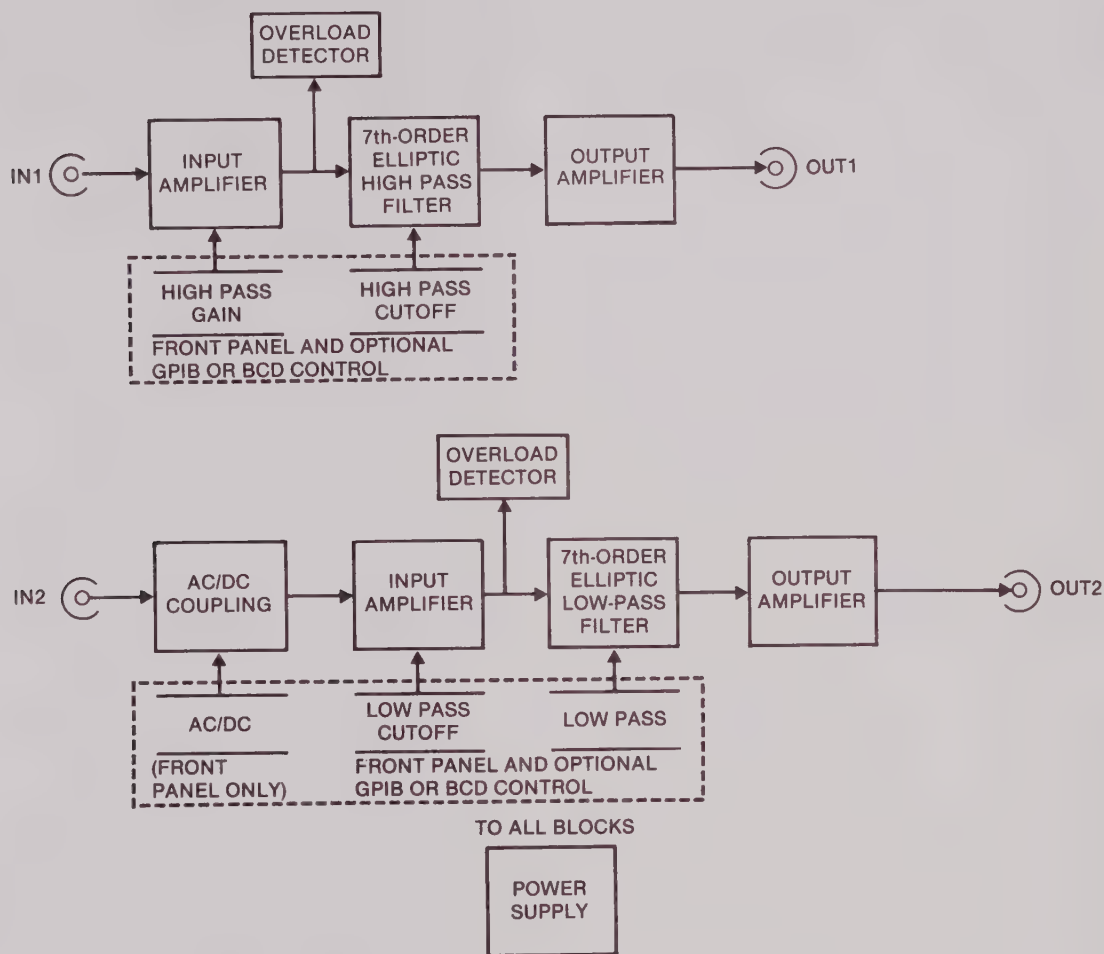


Figure 4-3. Model 753A Block Diagram

High Pass Filter

The input signal is applied to a low-noise input amplifier with programmable gain (Prefilter gain) of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed $\pm 10 V_{pk}$ or $7V_{rms}$. This signal is applied to an active RC seventh order high pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The high pass filters output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full scale output at $\pm 10 V_{pk}$ or $7V_{rms}$, which is the rated input of most A/D converters.

Low Pass Filter

The input signal is applied through the AC/DC coupling switch (front panel control only) to the input of a low noise input amplifier with programmable gain of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed $\pm 10 V_{pk}$ or $7V_{rms}$. This signal is applied to an active RC seventh order low pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The low pass filter output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full

scale output at $\pm 10 V_{pk}$ or $7V_{rms}$, which is the rated input of most A/D converters.

All filter parameters can be controlled by front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.5 ELLIPTIC FILTERS

This section provides general information relative to the filter sections used in the Models 751A, 752A, and 753A.

The seventh-order elliptic filter, as shown in figure 4-4, consists of a first order stage followed by three second-order stages. Also, figure 4-4 shows the zero/pole location for each stage, high pass and low pass filter amplitude responses, and transfer functions.

Figure 4-5 shows a simplified diagram for the first-order stage. This stage is a simple RC network followed by an unity gain noninverting operational amplifier. The R and C values determine the cutoff frequency. Notice the input and grounding connections for low pass and high pass filters.

Figure 4-6 shows a simplified diagram of the second order stage. This stage is a so-called state variable filter. The R and C values determine the cutoff frequency. R_Q sets the Q of the filter. R_L and R_H locates the zeros of the transfer function. The transfer function is represented by the general equation:

$$H(s) = \frac{a_0 + a_1s + a_2s^2}{b_0 + b_1s + b_2s^2}$$

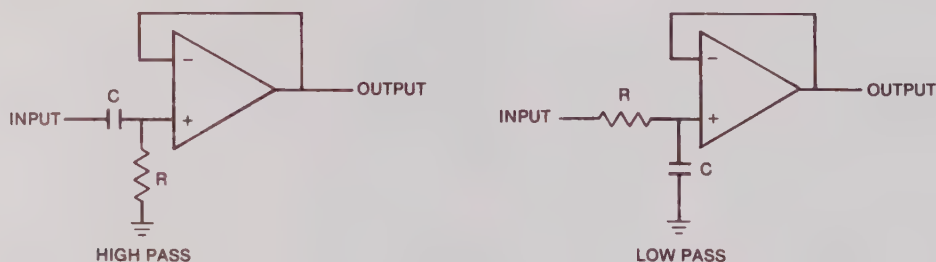


Figure 4-5. First-Order Stage

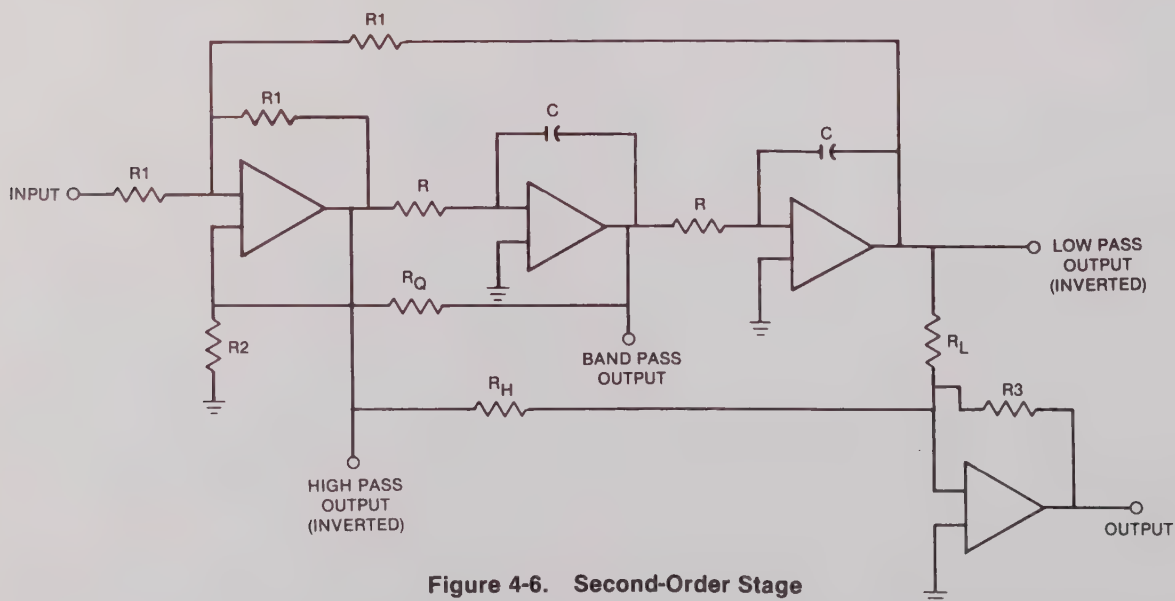


Figure 4-6. Second-Order Stage

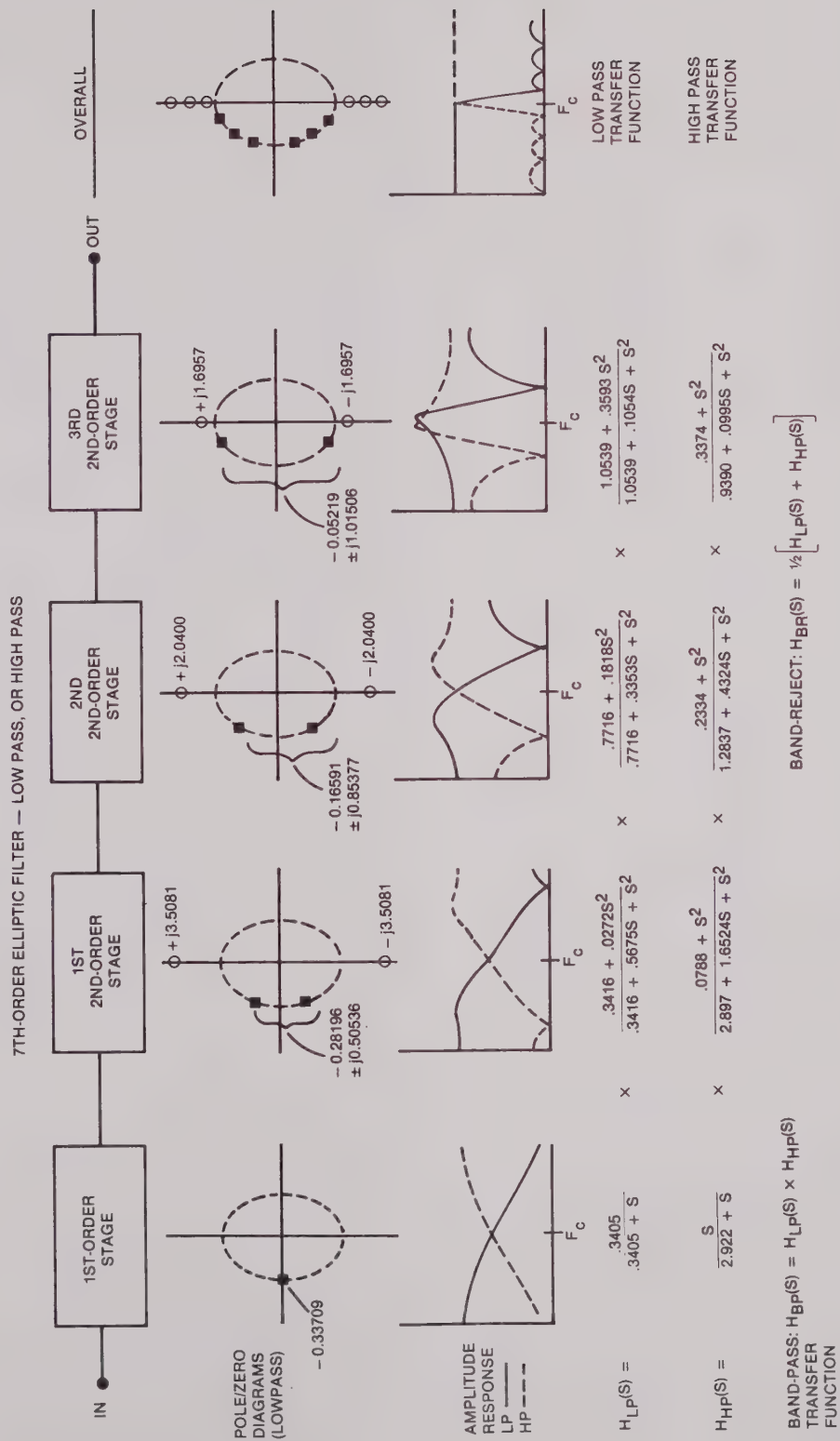


Figure 4-4. Seventh Order Elliptic Filter Parameters

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 CALIBRATION

Only limited calibration can be performed in the field, because these instruments are calibrated at the factory by comparing their response against the response of a "Factory Standard" instrument. The "Factory Standard", in turn, has been adjusted and is continuously maintained to provide a response which is essentially identical to the theoretical (or mathematical) response of these filters. As a result, it is recommended that any adjustments which alter the filter response be made only at the factory. The only adjustments that may be performed in the field are those pertaining to Gain Steps and DC Offsets.

Table 5-1 lists the required test equipment required to perform the tests and calibration procedures. Tables 5-2, 5-3, and 5-4 contain the dc offset and gain test for each model; perform these tests to identify calibration problems. Table 5-5 gives procedures for board access. Tables 5-6, 5-7, and 5-8 lists the actual calibration procedures for each model.

NOTE

The completion of these calibration procedures returns the instrument to correct calibration. All limits and tolerances given in these procedures are calibration guides and should not be interpreted as instrument specifications. Instrument specifications are given in section 1 of this manual.

Table 5-1. Required Test Equipment

Instrument	Suggested Model	Comments
Oscilloscope	Tektronix 475	Waveform viewing
Digital Voltmeter	Data Precision 2480	DC offset
RMS Voltmeter	Fluke 8921, 8922	Signal level
Signal Source	Wavetek 5100 Frequency Synthesizer	Gain accuracy
10 dB/Step Attenuator	Kay	Gain accuracy
50Ω BNC Termination	—	—

Table 5-2. 751A Gain and Offset Tests

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 751A as shown in figure 5-1. Model 5100: Freq 10.00 kHz, Output level 1.00 Vrms. Attenuator: 0dB	High Pass Cutoff: $01 \times 1\text{Hz}$ Low Pass Cutoff: $99 \times 1\text{kHz}$ Pre-Filter Gain: 0dB Post Filter Gain: 0dB	$0 \pm 0.2\text{ dB}$	_____

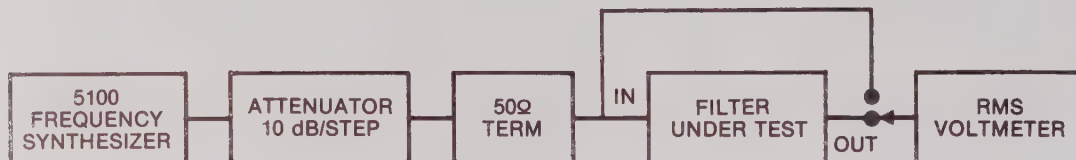


Figure 5-1. Gain Setup

Table 5-2. 751A Gain and Offset Tests (Continued)

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
2	10 dB Pre-filter Gain	Attenuator: 10 dB	Pre-filter: + 10 dB Post-filter: 0dB		_____
3	20 dB Pre-filter Gain	Attenuator: 20 dB	Pre-filter: + 20 dB Post-filter: 0dB		_____
4	30 dB Pre-filter Gain	Attenuator: 30 dB	Pre-filter: + 30 dB Post-filter: 0dB		_____
5	40 dB Pre-filter Gain	Attenuator: 40 dB	Pre-filter: + 40 dB Post-filter: 0dB		_____
6	10 dB Post-filter Gain	Attenuator: 10 dB	Pre-filter: 0dB Post-filter: + 10 dB		_____
7	20 dB Post-filter Gain	Attenuator: 20 dB	Pre-filter: 0dB Post-filter: + 20 dB		_____
8	0dB dc Offset	Connect Model 751A as shown in Figure 5-2	High Pass Cutoff: 01 × 1Hz. Low Pass Cutoff: 50 × 1kHz. Pre-filter Gain: 0dB Post-filter Gain: 0dB	Adjustable to 0Vdc	_____
9	+ 10 dB dc Offset		Pre-filter: + 10 dB Post-filter: 0dB		_____
10	+ 20 dB dc Offset		Pre-filter: + 20 dB Post-filter: 0dB		_____
11	+ 30 dB dc Offset		Pre-filter: + 30 dB Post-filter: 0dB		_____
12	+ 40 dB dc Offset		Pre-filter: + 40 dB Post-filter: 0dB		_____
13	+ 50 dB dc Offset		Pre-filter: + 40 dB Post-filter: + 10 dB		_____
14	+ 60 dB dc Offset		Pre-filter: + 40 dB Post-filter: + 20 dB		_____



Figure 5-2. Offset Setup

Table 5-3. 752A Gain and Offset Tests

When making the tests on the 752A, set the controls for both channels. Make the tests for Channel 1, then switch the cables to Channel 2 and make those tests.

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 752A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 10.00 kHz Output level 1.00 Vrms	Cutoff: 99 × 1kHz Gain: 0dB	0 ± 0.2 dB	Ch 1 _____ Ch 2 _____
2	10 dB Gain	Attenuator: 10 dB	Gain: + 10 dB		Ch 1 _____ Ch 2 _____
3	20 dB Gain	Attenuator: 20 dB	Gain: + 20 dB		Ch1 _____ Ch 2 _____
4	30 dB Gain	Attenuator: 30 dB	Gain: + 30 dB		Ch 1 _____ Ch 2 _____
5	40 dB Gain	Attenuator: 40 dB	Gain: + 40 dB		Ch 1 _____ Ch 2 _____
6	0dB dc Offset	Connect the Model 752A as shown in figure 5-2.	Cutoff: 50 × 1kHz Coupling: DC Gain: 0dB	Adjustable to 0Vdc	Ch 1 _____ Ch 2 _____
7	+ 10 dB dc Offset		Gain: + 10 dB		Ch 1 _____ Ch 2 _____
8	+ 20 dB dc Offset		Gain: + 20 dB		Ch 1 _____ Ch 2 _____
9	+ 30 dB dc Offset		Gain: + 30 dB		Ch 1 _____ Ch 2 _____
10	+ 40 dB dc Offset		Gain: + 40 dB		Ch 1 _____ Ch 2 _____

Table 5-4. 753A Gain and Offset Tests

When making the tests on the 753A, set the controls for both channels. Make the tests for Channel 1, then switch the cables to Channel 2 and make those tests.

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 753A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 10.00 kHz Output level 1.00 Vrms	High Pass Cutoff: 01 × 1Hz Low Pass Cutoff: 99 × 1kHz Gain: 0dB	0 ± 0.2 dB	Ch 1 _____ Ch 2 _____
2	10 dB Gain	Attenuator: 10 dB	Gain: + 10 dB		Ch 1 _____ Ch 2 _____
3	20 dB Gain	Attenuator: 20 dB	Gain: + 20 dB		Ch 1 _____ Ch 2 _____
4	30 dB Gain	Attenuator: 30 dB	Gain: + 30 dB		Ch 1 _____ Ch 2 _____
5	40 dB Gain	Attenuator: 40 dB	Gain: + 40 dB		Ch 1 _____ Ch 2 _____
6	0dB dc Offset	Connect the Model 753A as shown in figure 5-2.	High Pass Cutoff: 01 × 1Hz. Low Pass Cutoff: 50 × 1kHz. Coupling: DC. Gain: 0dB	Adjustable to 0Vdc	Ch 1 _____ Ch 2 _____
7	10 dB dc Offset		Gain: 10 dB		Ch 1 _____ Ch 2 _____
8	20 dB dc Offset		Gain: 20 dB		Ch 1 _____ Ch 2 _____
9	30 dB dc Offset		Gain: 30 dB		Ch 1 _____ Ch 2 _____
10	40 dB dc Offset		Gain: 40 dB		Ch 1 _____ Ch 2 _____

Table 5-5. Board Access

Step	Procedure	Associated Figure														
1	Unplug power cord.															
2	Remove two screws at rear of top cover; slide the top cover off.															
3	Grasp the card cage, pull it up and forward towards the front panel. Card cage will sit at top of unit.	5-3.														
4	Disconnect connectors at front of desired board. <table><tr><td></td><td>Top Board</td><td>Middle Board</td><td>Bottom Board</td></tr><tr><td>751A</td><td rowspan="3">GPIB/BCD Interface</td><td>High Pass</td><td>Low Pass</td></tr><tr><td>752A</td><td>Ch 1</td><td>Ch 2</td></tr><tr><td>753A</td><td>High Pass</td><td>Low Pass</td></tr></table>		Top Board	Middle Board	Bottom Board	751A	GPIB/BCD Interface	High Pass	Low Pass	752A	Ch 1	Ch 2	753A	High Pass	Low Pass	5-4.
	Top Board	Middle Board	Bottom Board													
751A	GPIB/BCD Interface	High Pass	Low Pass													
752A		Ch 1	Ch 2													
753A		High Pass	Low Pass													
5	Release rear retainer.	5-5.														
6	Slide desired board towards rear of instrument.	5-6.														
7	Place nonconductive material (such as cardboard) on top of card cage. Place the board on top and reconnect the connectors.	5-7.														

To reassemble the unit, reverse the order of the steps in this table.

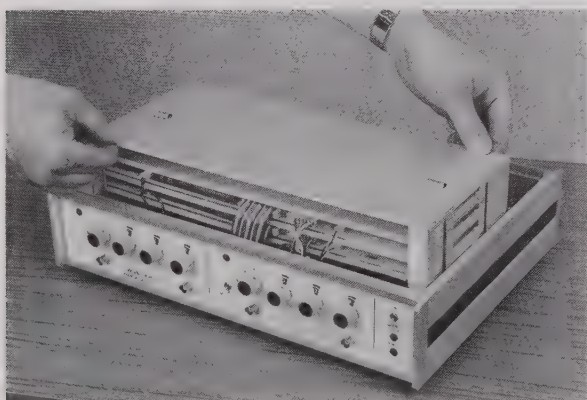


Figure 5-3. Moving Card Cage Out of Instrument

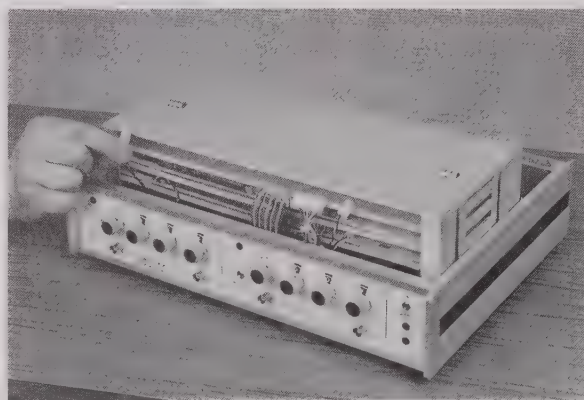


Figure 5-4. Disconnecting Connectors Board

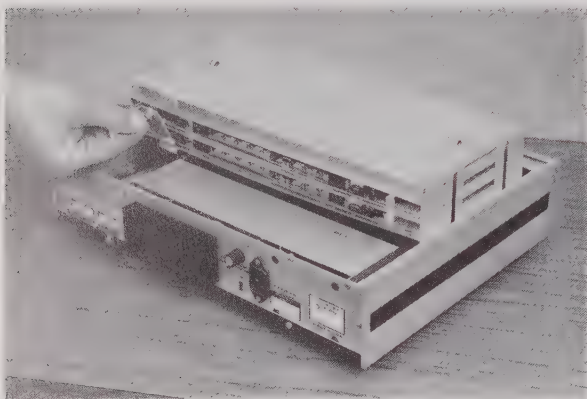


Figure 5-5. Releasing Rear Retainer

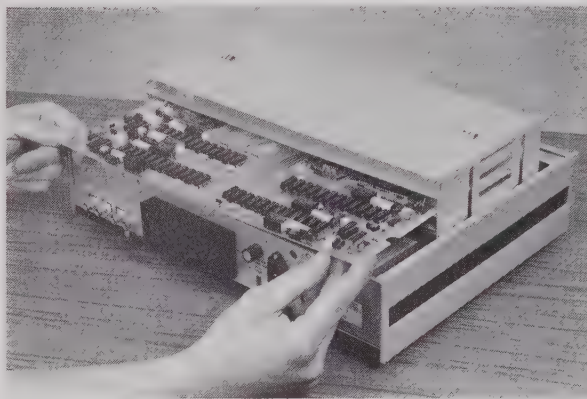


Figure 5-6. Sliding Out Board

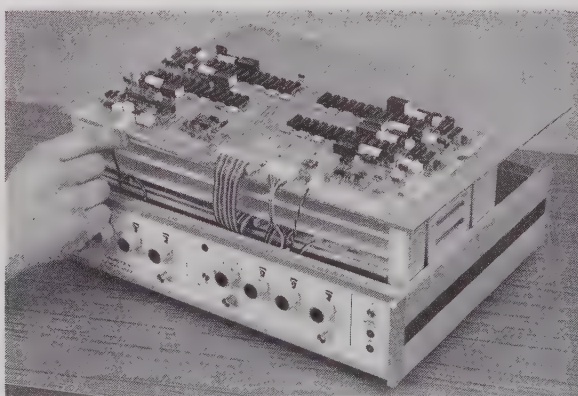


Figure 5-7. Reconnecting and Gaining Access to Board

Table 5-6. 751A Calibration Procedure

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments
1a	Gain	Connect 751A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1 Vrms	High Pass Cutoff: 01 × 1kHz Pre-filter Gain: 0dB	J14	RMS Voltmeter	R107	10.0 dB below	Access High Pass Filter board. Turn on, allow 10 min. warmup.
1b		Model 5100: Freq 10.0 kHz				C52		Replace high pass filter when finished.
2a	dc Offset	Connect 751A as shown in figure 5-2.	Pre-filter Gain: + 40 dB	TP1	DVM	R106	0 ± 10 mVdc	Access low pass filter board. Turn power on, allow 10 min. warm-up. Replace low pass filter when finished.
2b			Low Pass Cutoff: 50 × 1kHz Post-filter Gain: + 20 dB	OUT		R138		

Table 5-7. 752A Calibration Procedures

Before beginning, determine which channel requires calibration.

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments
1a	Gain	Connect Model 752A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	Cutoff: 99 × 1kHz Gain: 0dB	J14	RMS Voltmeter	R107	1.00 Vrms	Remove channel to be calibrated. Turn power on. Allow 10 warmup.
1b		Model 5100: Freq 10.0 kHz				C52		
2a	dc Offset	Connect Model 752A as shown in figure 5-2.	Cutoff: 50 × 1kHz Gain: + 40 dB Coupling: DC	TP1	DVM	R106	0 ± 10mV dc	Replace channel when finished
2b				OUT		R138		

Table 5-8. 753A Calibration Procedures

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments	
1a	High Pass Gain	Connect 753A as shown in figure 5-1 using IN1 and OUT 1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	High Pass Cutoff: 01 × 1Hz Gain: 0 dB	J14	RMS Voltmeter	R107	1.00 Vrms	Remove the High Pass filter board. Turn power on. Allow 10 min. warmup.	
1b		Model 5100: Freq 10.0 kHz				C52		Replace high pass filter when finished.	
2a	Low Pass Gain	Connect 753A as shown in figure 5-1 using IN 2 and OUT 2. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	Low Pass Cutoff: 99 × 1kHz Gain: 0dB	J14		R107			Remove the low pass filter board. Turn power on. Allow 10 min. warmup.
2b		Model 5100: Freq 10.0 kHz				C52			Replace low pass filter board when finished.
3a	High Pass dc Offset	Connect 753A as shown in figure 5-2 using IN 1 and OUT 1.	High Pass Cutoff: 50 × 10 Hz Gain: + 40 dB	TP1	DVM	R106	0 ± 10mV		Remover the High Pass filter board. Turn power on. Allow a 10 min. warmup.
3b				OUT 1		R138			Replace high pass filter when finished.
4a	Low Pass dc Offset	Connect 753A as shown in figure 5-2 using IN 2 and OUT 2.	Low Pass Cutoff: 50 × 1kHz Gain: + 40 dB Coupling: DC	TP1		R106		Remove low pass filter. Turn power on. Allow a 10 min. warmup.	
4b				OUT 2		R138		Replace low pass filter when finished.	

6.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

Customer Service
Wavetek San Diego, Inc.
9045 Balboa Avenue
San Diego, CA 92123
Telephone: (619) 279-2200

6.2 TROUBLESHOOTING

6.2.1 Filter Troubleshooting

If your filter fails to operate when the power switch is ON, perform the following checks.

1. Verify the filter has ac power.
2. Verify the 115/230 Volt switch is in the proper position.
3. Check the fuse and if defective, replace it.
4. With the power switch ON, check continuity of the unplugged line cord with an ohmmeter.

6.2.2 Optional GPIB Interface Troubleshooting

In the event that the bus system is not performing correctly, any functional tests may be made to help locate the cause. In general, an effort should be made to reduce both the hardware and software complexity of the system to the simplest configuration which still exhibits the problem.

Since the filter was exhaustively tested prior to shipment, the probability is low that problems encountered when first setting up the system are due to hardware failures. It is more likely that some set-up parameter, device address, or software convention is causing the problem.

Hardware failures are typically indicated only if the system has been successfully operating for some time and then fails with no system changes having been made.

6.2.2.1 Checklist of Set-up Problems

Before attempting diagnostic tests, the following list of common set-up errors should be checked:

1. Make sure power is applied to all units connected to the bus system. Although not true of this instrument, some units, when power is off, will load the bus and cause transmission failures.
2. Check tightness of the bus cable connectors. A connector which is not secured by the captive screws may become partially disengaged from its mating socket causing intermittent or open connections.
3. Review the address code structure of the system making sure that no two devices unintentionally share the same address code. Make sure the controller is correctly identifying each device by its respective address.
4. Make sure the cable between the filter and GPIB controller is correctly installed and locked into place at both ends.

6.2.2.2 Diagnostic Tests

Problems can generally be classified as either related to the bus system operation or to the filter operation. The controller is usually provided with some fault-indicating messages which can be useful in diagnosing bus problems.

1. Bus Testing
The most basic bus activity is the handshake function which is required for all universal commands and data transfers. The controller will generally indicate if there is a problem in completing the handshake. If a problem exists, the offending device can be determined by connecting devices to the bus one at a time.

Next level of activity is establishing the various devices as active listeners or talkers. Your instrument indicates its status by the green LISTEN lamp. Each bus device should respond appropriately to these universal commands and not interfere with each other. A unit-by-unit check of these operations will verify correct performance of these functions.

2. Instrument Testing

If bus activity appears normal but data is not being loaded correctly into your instrument, make sure a "CR" or "GET" command is being issued by the controller. In addition, the REMOTE lamp on the front panel of your instrument must be lit during remote transfers. If not, check that the REMOTE ENABLE line on the bus is sent active by the controller.

7

SECTION

PARTS AND SCHEMATICS

7.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown below.

7.2 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are

inserted immediately inside the rear cover. If no such pages exist, the manual is correct as printed.

7.3 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit, and, if applicable, the function performed.

NOTE

An assembly drawing number is not necessarily the assembly part number. However, the assembly parts list number is the assembly part number.

MODEL	DRAWING	DRAWING NUMBER
751A	Low Pass Filter Schematic	03-004-0755
751A	Low Pass Filter Assembly	02-004-0755
751A	Low Pass Filter Parts List	004-0755
751A	High Pass Filter Schematic	03-004-0760
751A	High Pass Filter Assembly	02-004-0760
751A	High Pass Filter Parts List	004-0760
752A, 753A	Low Pass Filter Schematic	03-004-0750
752A, 753A	Low Pass Filter Assembly	02-004-0750
752A, 753A	Low Pass Filter Parts List	004-0750
753A	High Pass Filter Schematic	03-004-0753
753A	High Pass Filter Assembly	02-004-0753
753A	High Pass Filter Parts List	004-0753
751A, 752A, 753A	Power Supply Schematic	03-004-0765
751A, 752A, 753A	Power Supply Assembly	02-004-0765
751A, 752A, 753A	Power Supply Parts List	004-0765
751A, 752A, 753A	BCD Interface Schematic	03-004-0780
751A, 752A, 753A	BCD Interface Assembly	02-004-0780
751A, 752A, 753A	BCD Interface Parts List	004-0780
751A, 752A, 753A	IEEE Interface Schematic	03-004-0785
751A, 752A, 753A	IEEE Interface Assembly	02-004-0785
751A, 752A, 753A	IEEE Interface Parts List	004-0785

PARTS LIST
LOW PASS FILTER BOARD A3
MODEL 751A
Assembly Number 004-0755 — 1 Of 4

Reference Designators	Part Description	WAVETEK Part Number
C1, C6, C7, C17, C18, C28, C29	FX PLYCRB 1.0 UF — .5 + 0% 100V	104-5103
C2	FX PLYSTY .1 UF — .5 + 0% 50V	104-4106
C3, C10, C11, C21, C22, C32, C33	FX PLYSTY .01 UF — .5 + 0% 100V	104-3106
C4, C13, C24, C35	FX MICA DP 910 PF 1% 500V	101-1910
C5, C14, C25, C36	VAR CRM 15-60 PF	108-0600
C8, C9, C19, C20, C30, C31	FX PLYSTY 0.1 UF — .5 + 0% MATCH PR.	104-4107
C12, C23, C34	FX MICA DP 1000 PF 1% 500V	101-2101
C15, C16, C26, C27, C37, C38, C82, C83	FX MONO .01 UF + 80-20% 50V	100-3105
C41, C42, C44, C47	FX TANT .10 UF 20% 35V	109-4100
C43, C84	FX MICA DP 300 PF 10% 500V	101-1300
C45, C62-C74	FX TANT 10 UF 20% 20V	109-6100
C46	FX MICA DP 200 PF 10% 500V	101-1200
C75	FX TANT 68 UF 10% 6V	109-6680
C76	FX PLSTR .47 UF 5% 100V	105-4470
C80, C90-C92	FX MICA DP 12 PF 10% 500V	101-0120
C85	FX MICA DP 150 PF 10% 500V	101-1150
C86-C89	FX MICA DP 22 PF 10% 500V	101-0220
C93-C95	SELECT IN TEST	
CR1, CR7, CR11, CR12	SL LW LK 70 PIV 200 MW (IN 457)	132-0457
CR3, CR5, CR9, CR10	SL ZR 5.1V 5% 400 MW (IN 751A)	131-9510
E2-E4	PLUG: SHORTING (LOW PROF)	352-0200
J10	PLUG: HDR 26 PIN DIL RT ANG ST LOCK	352-2601
J11	CONN: HDR 8 POS RTANG LOCKING	354-0020
J12-J13	CONN: 2 PIN R/A HDR F/L	354-0022
K1-K12, K52-K53	REED DIP 1 FORM A 5V	175-1505
K13-K48	REED DIP 2 FORM A 5V	175-1057
L1-L2	FX 1MHY 10%	150-2100
Q1	SIL PNP 2N4249	136-4249
R1	FX MFLM 468 1% 1/8W	113-4680
R2	FX MFLM 234K 1% 1/8W	113-2340

PARTS LIST
LOW PASS FILTER BOARD A3
MODEL 751A
ASSEMBLY NUMBER 004-0755 — 2 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R3	FX MFLM 117K 1% 1/8W	113-1170
R4	FX MFLM 58.4K 1% 1/8W	112-5840
R5	FX MFLM 46.8K 1% 1/8W	112-4680
R6	FX MFLM 23.4K 1% 1/8W	112-2340
R7	FX MFLM 11.7K 1% 1/8W	112-1170
R8	FX MFLM 5.84K 1% 1/8W	111-5840
R9-R10	FX MFLM 272.3K 0.5% 1/8W	113-2728
R11-R12	FX MFLM 136.2K 0.5% 1/8W	113-1368
R13-R14	FX MFLM 68.08K 0.5% 1/8W	112-6808
R15-R16	FX MFLM 34.04K 0.5% 1/8W	112-3408
R17-R18	FX MFLM 27.23K 0.5% 1/8W	112-2728
R19-R20	FX MFLM 13.62K 0.5% 1/8W	112-1368
R21-R22	FX MFLM 6.808K 0.5% 1/8W	111-6808
R23-R24	FX MFLM 3.404K 0.5% 1/8W	111-3408
R25	VAR CMT 500 OHM 3/8 SQ FM	118-1503
R26, R28, R54	FX MFLM 4.42K 1% 1/10W	111-4421
R27, R53, R79	RESNET 2.20K 1% $\times$ 8	128-2223
R30, R56, R82-R83	FX CFLM 10K 5% 1/4W	116-3101
R32	FX MFLM 200K 1% 1/10W	113-2001
R33-R34, R59-R60, R85-R86	FX MFLM 5.56K 0.5% 1/10W	111-5561
R35-R36	FX MFLM 181.2K 0.1% 1/8W	113-1819
R37-R38	FX MFLM 90.59K 0.1% 1/8W	112-9059
R39-R40	FX MFLM 45.30K 0.1% 1/8W	112-4539
R41-R42	FX MFLM 22.65K 0.1% 1/8W	112-2269
R43-R44	FX MFLM 18.12K 0.1% 1/8W	112-1819
R45-R46	FX MFLM 9.059K 0.1% 1/8W	111-9059
R47-R48	FX MFLM 4.530K 0.1% 1/8W	111-4539
R49-R50	FX MFLM 2.265K 0.1% 1/8W	111-2269
R51, R81	VAR CMT 1.0K 3/8 SQ FM	118-2102
R52	FX MFLM 14.7K 1% 1/10W	112-1471
R58	FX MFLM 30.5K 1% 1/10W	112-3051

PARTS LIST
LOW PASS FILTER BOARD A3
MODEL 751A
ASSEMBLY NUMBER 004-0755 — 3 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R61-R62	FX MFLM 155.0K 0.1% 1/8W	113-1559
R63-R64	FX MFLM 77.52K 0.1% 1/8W	112-7759
R65-R66	FX MFLM 38.76K 0.1% 1/8W	112-3879
R67-R68	FX MFLM 19.38K 0.1% 1/8W	112-1939
R69-R70	FX MFLM 15.50K 0.1% 1/8W	112-1559
R71-R72	FX MFLM 7.752K 0.1% 1/8W	111-7759
R73-R74	FX MFLM 3.876K 0.1% 1/8W	111-3879
R75-R76	FX MFLM 1.938K 0.1% 1/8W	111-1939
R77	VAR CMT 5.0K 3/8 SQ FM	118-2502
R78	FX MFLM 60.4K 1% 1/10W	112-6041
R80	FX MFLM 3.40K 1% 1/10W	111-3401
R84	FX MFLM 15.4K 1% 1/10W	112-1541
R91, R96	FX CFLM 1.0K 5% 1/4W	116-2101
R92, R94	FX MFLM 1.00K 1% 1/10W	111-1001
R93, R95, R143-R144	FX MFLM 2.15K 1% 1/10W	111-2151
R97, R99	FX CFLM 10 OHM 5% 1/4W	116-0101
R98, R148	FX CFLM 1.0M 5% 1/4W	116-5101
R122-R126, R128-R131	FX CFLM 100 OHM 5% 1/4W	116-1101
R132	FX CFLM 4.7 OHM 5% 1/4W	116-9471
R137	FX MFLM 10.0K 1% 1/10W	112-1001
R138	VAR CMT 100K 3/8 SQ EM	118-4102
R139	FX MFLM 100K 1% 1/10W	113-1001
R140, R145	FX MFLM 4.32K 1% 1/10W	111-4321
R141	FX MFLM 328 OHM 1% 1/10W	110-3289
R142	FX MFLM 953 OHM 1% 1/10W	110-9531
R146	FX CFLM 47 OHM 5% 1/4W	116-0471
R147	FX CFLM 82 OHM 5% 1/4W	116-0821
None	JUMPER	353-0104
None	SOCKET: IC 14 PIN DIP ST	353-1403
None	NYLON SNAP BUTTON (MB1-156)	376-2109
U1, U3, U5, U7	LIN OP-AMP (LF351N)	120-1017

PARTS LIST
LOW PASS FILTER BOARD A3
MODEL 751A
ASSEMBLY NUMBER 004-0755 — 4 Of 4

Reference Designator	Part Description	WAVETEK Part Number
U2, U4, U6	QUAD LIN OP-AMP SEL (LF347N)	120-2007
U8	ANALOG VOLT COMP (LM339)	120-3339
U13	LIN OP-AMP (LF357)	120-1019
U14	LIN OP-AMP (NE5534)	120-1018

PARTS LIST
HIGH PASS FILTER BOARD A2
MODEL 751A
Assembly Number 004-0760 — 1 Of 4

Reference Designators	Part Description	WAVETEK Part Number
C1, C6, C7, C17, C18, C28, C29	FX PLYCRB 1.0 UF — .5 + 0% 100V	104-5103
C2	FX PLYSTY .1 UF — .5 + 0% 50V	104-4106
C3, C10, C11, C21, C22, C32, C33	FX PLYSTY .01 UF — .5 + 0% 100V	104-3106
C4, C13, C24, C35	FX MICA DP 910 PF 1% 500V	101-1910
C5, C14, C25, C36	VAR CER 15-60 PF	108-0600
C8, C9, C19, C20, C30, C31	FX PLYSTY 0.1 UF — .5 + 0% MATCH PR.	104-4107
C12, C23, C34	FX MICA DP 1000 PF 1% 500V	101-2101
C15, C16, C26, C27, C37, C38, C55, C56	FX MONO .01 UF + 80-20% 50V	100-3105
C41, C42, C44, C47	FX TANT .10 UF 20% 35V	109-4100
C43, C53, C57	FX MICA DP 300 PF 10% 500V	101-1300
C45, C61-C74	FX TANT 10 UF 20% 20V	109-6100
C46	FX MICA DP 200 PF 10% 500V	101-1200
C51	FX MICA DP 18 PF 10% 500V	101-0180
C52	VAR CER 3.5-18 PF	108-0180
C54	FX MICA DP 15 PF 10% 500V	101-0150
C58	FX MICA DP 150 PF 10% 500V	101-1150
C75	FX TANT 68 UF 20% 6V	109-6680
C85, C87-C89	FX MICA DP 22 PF 10% 500V	101-0220
C86	FX MICA DP 47 PF 10% 500V	101-0470
C90-C92, C96-C97	FX MICA DP 12 PF 50% 500V	101-0120
C93-C95	SELECT IN TEST	
C98	FX MICA DP 30 PF 10% 500V	101-0300
CR1, CR3, CR7, CR11, CR12, CR15	SL LW LK 70 PIV 200 MW (IN 457)	132-0457
CR5, CR9, CR10	SL ZR 5.1V 5% 400 MW (IN 751A)	131-9510
CR16	GER 120 PIV 100 MA (IN 277)	132-0277
E2-E4, E7	SHORTING (LOW PROF)	352-0200
J9, J14	CONN: 2 PIN R/A HDR F/L	354-0022
J10	PLUG: HDR 26 PIN DIL RT ANG ST LOCK	352-2601
J11	CONN: HDR 8 POS RTANG LOCKING	354-0020

PARTS LIST
HIGH PASS FILTER BOARD A2
MODEL 751A
ASSEMBLY NUMBER 004-0760 — 2 Of 4

Reference Designator	Part Description	WAVETEK Part Number
K1-K12, K50-K51	REED DIP 1 FORM A 5V	175-1505
K13-K48	REED DIP 1 FORM A 5V	175-1057
K49	REED DIP 1 FORM C 5V	175-1056
L1-L2	FX 1MHY 10%	150-2100
Q1	SIL PNP 2N4249	136-4249
R1	FX MFLM 54.5K 1% 1/8W	112-5450
R2	FX MFLM 27.2K 1% 1/8W	112-2720
R3	FX MFLM 13.6K 1% 1/8W	112-1360
R4	FX MFLM 6.81K 1% 1/8W	111-6810
R5	FX MFLM 5.45K 1% 1/8W	111-5450
R6	FX MFLM 2.72K 1% 1/8W	111-2720
R7	FX MFLM 1.36K 1% 1/8W	111-1360
R8	FX MFLM 681 OHM 1% 1/8W	110-6810
R9-R10	FX MFLM 93.51K 0.5% 1/8W	112-9358
R11-R12	FX MFLM 46.75K 0.5% 1/8W	112-4678
R13-R14	FX MFLM 23.38K 0.5% 1/8W	112-2338
R15-R16	FX MFLM 11.69K 0.5% 1/8W	112-1168
R17-R18	FX MFLM 9.351K 0.5% 1/8W	111-9358
R19-R20	FX MFLM 4.675K 0.5% 1/8W	111-4678
R21-R22	FX MFLM 2.338K 0.5% 1/8W	111-2338
R23-R24	FX MFLM 1.169K 0.5% 1/8W	111-1168
R25	VAR CMT 500 OHM 3/8 SQ FM	118-1503
R26, R28	FX MFLM 20.5 OHM 1% 1/8W	112-2050
R27	RESNET 10.0K 1% $\times$ 8	128-3103
R30, R56, R82, R83	FX CFLM 10K 5% 1/4W	116-3101
R32, R34, R58, R60, R84, R86	FX MFLM 5.56K 0.5% 1/10W	111-5561
R33	FX MFLM 200K 1% 1/10W	113-2001
R35-R36	FX MFLM 140.5K 0.1% 1/8W	113-1408
R37-R38	FX MFLM 70.27K 0.1% 1/8W	112-7028
R39-R40	FX MFLM 35.13K 0.1% 1/8W	112-3518
R41-R42	FX MFLM 17.57K 0.1% 1/8W	112-1758

PARTS LIST
HIGH PASS FILTER BOARD A2
MODEL 751A
ASSEMBLY NUMBER 004-0760 — 3 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R43-R44	FX MFLM 14.05K 0.1% 1/8W	112-1408
R45-R46	FX MFLM 7.027K 0.1% 1/8W	111-7028
R47-R48	FX MFLM 3.513K 0.1% 1/8W	111-3518
R49-R50	FX MFLM 1.757K 0.1% 1/8W	111-1758
R51, R81, R107	VAR CMT 1.0K 3/8 SQ FM	118-2102
R52	FX MFLM 14.7K 1% 1/10W	112-1471
R53, R79	RESNET 2.20K 1% × 8	128-2223
R54	FX MFLM 4.42K 1% 1/10W	111-4421
R59	FX MFLM 30.5K 1% 1/10W	112-3059
R61-R62	FX MFLM 164.2K 0.1% 1/8W	113-1648
R63-R64	FX MFLM 82.12K 0.1% 1/8W	112-8218
R65-R66	FX MFLM 41.06K 0.1% 1/8W	112-4108
R67-R68	FX MFLM 20.53K 0.1% 1/8W	112-2058
R69-R70	FX MFLM 16.42K 0.1% 1/8W	112-1649
R71-R72	FX MFLM 8.212K 0.1% 1/8W	111-8219
R73-R74	FX MFLM 4.106K 0.1% 1/8W	111-4109
R75-R76	FX MFLM 2.053K 0.1% 1/8W	111-2059
R77	VAR CMT 5.0K 3/8 SQ FM	118-2502
R78	FX MFLM 60.4K 1% 1/10W	112-6041
R80	FX MFLM 3.40 OHM 1% 1/10W	111-3401
R85	FX MFLM 15.4 OHM 1% 1/10W	112-1541
R91, R96	FX CFLM 1.0K 5% 1/4W	116-2101
R92, R94	FX MFLM 3.57K 1% 1/10W	111-3571
R93, R95	FX MFLM 1.00K 1% 1/10W	111-1001
R97, R99	FX CFLM 10 OHM 5% 1/4W	116-0101
R98	FX CFLM 1.0M 5% 1/4W	116-5101
R101	FX MFLM 900K 1% 1/10W	113-9009
R102	FX MFLM 100K 1/10W	113-1001
R103	FX MFLM 2.40K 5% 2W 200 PPM	111-2403
R104-R105	FX MFLM 6.81K 1/10W	111-6811
R106	VAR CMT 1.0K 3/8 SQ EM	118-2101

PARTS LIST
HIGH PASS FILTER BOARD A2
MODEL 751A
ASSEMBLY NUMBER 004-0760 — 4 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R108	FX MFLM 8.98 OHM 1 % 1/10W	111-8989
R109	FX MFLM 328 OHM 200 PPM 1/10W	110-3289
R110	FX MFLM 1.37 OHM 1 % 1/8W	111-1370
R111, R114	FX MFLM 4.32 OHM 200 PPM 1/10W	111-4321
R112, R113	FX MFLM 2.15K 1 % 1/10W	111-2151
R115, R121-R131	FX CFLM 100 OHM 5% 1/4W	116-1101
R132	FX CFLM 4.7 OHM 5% 1/4W	116-9471
R147	FX CFLM 82 OHM 5% 1/4W	116-0821
None	SOCKET: JUMPER	353-0104
None	SOCKET: IC 14 PIN DIP ST	353-1403
None	NYLON SNAP BUTTON (MB1-156)	376-2109
TP-1	TERM PIN WW .025 GOLD PLT	354-0003
U1, U3, U5, U7, U11	LIN OP-AMP (LF351N)	120-1017
U2, U4, U6	QUAD LIN OP-AMP SEL (LF347N)	120-2007
U8	ANALOG VOLT COMP (LM339)	120-3339
U9	DUAL MATCHED FET (NPD5566)	138-5566
U10	LIN OP-AMP (NE5534)	120-1018

PARTS LIST
LOW PASS FILTER BOARD A2, A3
MODEL 752A, 753A
Assembly Number 004-0750 — 1 Of 4

Reference Designators	Part Description	WAVETEK Part Number
C1, C6, C7, C17, C18, C28, C29	FX PLYCRB 1.0 UF — .5 + 0% 100V	104-5103
C2	FX PLYSTY .1 UF — .5 + 0% 50V	104-4106
C3, C10, C11, C21, C22, C32, C33	FX PLYSTY .01 UF — .5 + 0% 100V	104-3106
C4, C13, C24, C35	FX MICA DP 910 PF 1% 500V	101-1910
C5, C14, C25, C36	VAR CRM 15-60 PF	108-0600
C8, C9, C19, C20, C30, C31	FX PLYSTY 0.1 UF — .5 + 0% MATCH PR.	104-4107
C12, C23, C34	FX MICA DP 1000 PF 1% 500V	101-2101
C15, C16, C26, C27, C37, C38, C55, C56, C82, C83	FX MONO .01 UF + 80-20% 50V	100-3105
C41, C42, C44, C47	FX TANT .10 UF 20% 35V	109-4100
C43, C53, C57, C84	FX MICA DP 300 PF 10% 500V	101-1300
C45, C61-C74	FX TANT 10 UF 20% 20V	109-6100
C46	FX MICA DP 200 PF 10% 500V	101-1200
C51	FX MICA DP 18 PF 10% 500V	101-0180
C52	VAR MICA 3.5-18 PF	108-0180
C54	FX MICA DP 15 PF 10% 500V	101-0150
C58, C85	FX MICA DP 150 PF 10% 500V	101-1150
C75	FX TANT 68 UF 10% 6V	109-6680
C81, C90-C92	FX MICA DP 12 PF 10% 500V	101-0120
C87-C89	FX MICA DP 22 PF 10% 500V	101-0220
C93-C95	SELECT IN TEST	
CR1-CR2, CR7-CR8, CR11-CR12, CR15	SL LW LK 70 PIV 200 MW (IN 457)	132-0457
CR3-CR6, CR9, CR10	SL ZR 5.1V 5% 400 MW (IN 751A)	131-9510
CR16	GER 120 PIV 100 MA (IN 277)	132-0277
E1-E4, E7	PLUG: SHORTING (LOW PROF)	352-0202
J9, J12	CONN: HDR F/L 2 PIN R/A	354-0022
J10	CONN: HDR 26 PIN DIL RT ANG ST LOCK	352-2601
J11	HDR 8 POS RTANG LOCKING	354-0020
K1-K12, K50-K51	REED DIP 1 FORM A 5V	175-1505
K13-K48	REED DIP 2 FORM A 5V	175-1507

PARTS LIST
LOW PASS FILTER BOARD A2, A3
MODELS 752A, 753A
ASSEMBLY NUMBER 004-0750 — 2 Of 4

Reference Designator	Part Description	WAVETEK Part Number
K49	REED DIP 1 FORM C 5V	175-1506
L1-L2	FX 1MHY 10%	150-2100
Q1	SIL PNP 2N4249	136-4249
R1	FX MFLM 468K 1% 1/8W	113-4680
R2	FX MFLM 234K 1% 1/8W	113-2340
R3	FX MFLM 117K 1% 1/8W	113-1170
R4	FX MFLM 58.4K 1% 1/8W	112-5840
R5	FX MFLM 46.8K 1% 1/8W	112-4680
R6	FX MFLM 23.4K 1% 1/8W	112-2340
R7	FX MFLM 11.7K 1% 1/8W	112-1170
R8	FX MFLM 5.84K 1% 1/8W	111-5840
R9-R10	FX MFLM 272.3K 0.5% 1/8W	113-2728
R11-R12	FX MFLM 136.2K 0.5% 1/8W	113-1368
R13-R14	FX MFLM 68.08K 0.5% 1/8W	112-6808
R15-R16	FX MFLM 34.04K 0.5% 1/8W	112-3408
R17-R18	FX MFLM 27.23K 0.5% 1/8W	112-2728
R19-R20	FX MFLM 13.62K 0.5% 1/8W	112-1368
R21-R22	FX MFLM 6.808K 0.5% 1/8W	111-6808
R23-R24	FX MFLM 3.404K 0.5% 1/8W	111-3408
R25	VAR CMT 500 OHM 3/8 SQ FM	118-1503
R26, R28, R54	FX MFLM 4.42K 1% 1/10W	111-4421
R27, R53, R79	RES NET 2.20K 1% × 8	128-2223
R30-R31, R56-R57, R82-R83	FX CFLM 10K 5% 1/4W	116-3101
R32	FX MFLM 200K 1% 1/10W	113-2001
R33-R34, R59-R60, R85-R86	FX MFLM 5.56K 0.5% 1/10W	111-5561
R35-R36	FX MFLM 181.2K 0.1% 1/8W	113-1819
R37-R38	FX MFLM 90.59K 0.1% 1/8W	112-9059
R39-R40	FX MFLM 45.30K 0.1% 1/8W	112-4539
R41-R42	FX MFLM 22.65K 0.1% 1/8W	112-2269
R43-R44	FX MFLM 18.12K 0.1% 1/8W	112-1819
R45-R46	FX MFLM 9.059K 0.1% 1/8W	111-9059
R47-R48	FX MFLM 4.530K 0.1% 1/8W	111-4539

PARTS LIST
LOW PASS FILTER BOARD A2, A3
MODELS 752A, 753A
ASSEMBLY NUMBER 004-0750 — 3 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R49-R50	FX MFLM 2.265K 0.1% 1/8W	111-2269
R51, R81, R107	VAR CMT 1.0K 3/8 SQ FM	118-2102
R52	FX MFLM 14.7K 1% 1/10W	112-1471
R58	FX MFLM 30.5K 1% 1/10W	112-3051
R61-R62	FX MFLM 155.0K 0.1% 1/8W	113-1559
R63-R64	FX MFLM 77.52K 0.1% 1/8W	112-7759
R65-R66	FX MFLM 38.76K 0.1% 1/8W	112-3879
R67-R68	FX MFLM 19.38K 0.1% 1/8W	112-1939
R69-R70	FX MFLM 15.50K 0.1% 1/8W	112-1559
R71-R72	FX MFLM 7.752K 0.1% 1/8W	111-7759
R73-R74	FX MFLM 3.876K 0.1% 1/8W	111-3879
R75-R76	FX MFLM 1.938K 0.1% 1/8W	111-1939
R77	VAR CMT 5.0K 3/8 SQ FM	118-2502
R78	FX MFLM 60.4K 1% 1/10W	112-6041
R80	FX MFLM 3.40K 1% 1/10W	111-3401
R84	FX MFLM 15.4K 1% 1/10W	112-1541
R91, R96	FX CFLM 1.0K 5% 1/4W	116-2101
R92, R94	FX MFLM 3.57K 1% 1/10W	111-3571
R93, R95	FX MFLM 1.00K 1% 1/10W	111-1001
R97, R99	FX CFLM 10 OHM 5% 1/4W	116-0101
R98	FX CFLM 1.0M 5% 1/4W	116-5101
R101	FX MFLM 900K 1% 1/10W	113-9009
R102, R139	FX MFLM 100K 1% 1/10W	113-1001
R103	FX MFLM 2.40K 5% 2W 200 PPM	111-2403
R104-R105	FX MFLM 6.81K 1% 1/10W	111-6811
R106	VAR CMT 1.0K 3/8 SQ FM 18T	118-2103
R108	FX MFLM 8.98K 1% 1/10W	111-8989
R109	FX MFLM 328 OHM .5% 1/10W	110-3281
R110	FX MFLM 1.37K 1% 1/8W	111-1370
R111, R114, R145	FX MFLM 4.32K 1% 1/10W	111-4321
R112-R113, R137, R143-R144	FX MFLM 2.15K 1% 1/10W	111-2151

PARTS LIST
LOW PASS FILTER BOARD A2, A3
MODELS 752A, 753A
ASSEMBLY NUMBER 004-0750 — 4 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R115, R121-R131	FX CLFM 100 OHM 5% 1/4W	116-1101
R132	FX CFLM 4.7 OHM 5% 1/4W	116-9471
R136	VAR CMT 10K 3/8 SQ EM	118-3103
R138	VAR CMT 100K 3/8 SQ FM 18T	118-4104
R140	FX MFLM 90.9 OHM 1% 1/10W	119-9091
R141	FX MPLM 909 OHM 1% 1/10W	110-9091
R146	FX CFLM 47 OHM 5% 1/4W	116-0471
R147	FX CFLM 82 OHM 5% 1/4W	116-0821
None	JUMPER	353-0104
None	SOCKET: IC 14 PIN DIP ST	353-1403
TP-1	TERM PIN WW .025 GOLD PLT	354-0003
U1, U3, U5, U7, U11	LIN OP-AMP (LF351N)	120-1017
U2, U4, U6	QUAD LIN OP-AMP SEL (LF347N)	120-2007
U8	ANALOG VOLT COMP (LM339)	120-3339
U9	DUAL MATCHED FET (NPD5566)	138-5566
U10, U13-U14	LIN OP-AMP (NE5534)	120-1018

PARTS LIST
HIGH PASS FILTER BOARD A3
MODEL 753A
Assembly Number 004-0753 — 1 Of 4

Reference Designators	Part Description	WAVETEK Part Number
C1, C6, C7, C17, C18, C28, C29	FX PLYCRB 1.0 UF — .5 + 0% 100V	104-5103
C2	FX PLYSTY .1 UF — .5 + 0% 50V	104-4106
C3, C10, C11, C21, C22, C32, C33	FX PLYSTY .01 UF — .5 + 0% 100V	104-3106
C4, C13, C24, C35	FX MICA DP 910 PF 1% 500V	101-1910
C5, C14, C25, C36	VAR CRM 15-60 PF	108-0600
C8, C9, C19, C20, C30, C31	FX PLYSTY 0.1 UF — .5 + 0% MATCH PR.	104-4107
C12, C23, C34	FX MICA DP 1000 PF 1% 500V	101-2101
C15, C16, C26, C27, C37, C38, C55, C56, C82, C83	FX MONO .01 UF +80-20% 50V	100-3105
C41, C42, C44, C47	FX TANT .10 UF 20% 35V	109-4100
C43, C53, C57, C84	FX MICA DP 300 PF 10% 500V	101-1300
C45, C61-C74	FX TANT 10 UF 20% 20V	109-6100
C46	FX MICA DP 200 PF 10% 500V	101-1200
C51	FX MICA DP 18 PF 10% 500V	101-0180
C52	VAR CER 3.5-18 PF	108-0180
C54	FX MICA DP 15 PF 10% 500V	101-0150
C58, C100	FX MICA DP 150 PF 10% 500V	101-1150
C75	FX TANT 68 UF 20% 6V	109-6680
C81, C99	FX PLSTR .47 UF 5% 100V	105-4470
C85, C87-C89	FX MICA DP 22 PF 10% 500V	101-0220
C86	FX MICA DP 47 PF 10% 500V	101-0470
C90-C92, C96-C97	FX MICA DP 12 PF 10% 500V	101-0120
C93-C95	SELECT IN TEST	
C98	FX MICA DP 30 PF 10% 500V	101-0300
CR1, CR3, CR7, CR11, CR12, CR15	SL LW LK 70 PIV 200 MW (IN 457)	132-0457
CR5, CR9, CR10	SL ZR 5.1V 5% 400 MW (IN 751A)	131-9510
CR16	GER 120 PIV 100 MA (IN 277)	132-0277
E1-E4, E7	PLUG: SHORTING (LOW PROF)	352-0202
J9, J12	CONN: 2 PIN R/A HDR F/L	354-0022
J10	PLUG: HDR 26 PIN DIL RT ANG ST LOCK	352-2601

PARTS LIST
HIGH PASS FILTER BOARD A3
MODEL 753A
ASSEMBLY NUMBER 004-0753 — 2 Of 4

Reference Designator	Part Description	WAVETEK Part Number
J11	CONN: HDR 8 POS RTANG LOCKING	354-0020
K1-K12, K50-K51	REED DIP 1 FORM A 5V	175-1505
K13-K48	REED DIP 2 FORM A 5V	175-1057
K49	REED DIP 1 FORM C 5V	175-1056
L1-L2	FX 1MHY 10%	150-2100
Q1	SIL PNP 2N4249	136-4249
R1	FX MFLM 54.5K 1% 1/8W	112-5450
R2	FX MFLM 27.2K 1% 1/8W	112-2720
R3	FX MFLM 13.6K 1% 1/8W	112-1360
R4	FX MFLM 6.81K 1% 1/8W	111-6810
R5	FX MFLM 5.45K 1% 1/8W	111-5450
R6	FX MFLM 2.72K 1% 1/8W	111-2720
R7	FX MFLM 1.36K 1% 1/8W	111-1360
R8	FX MFLM 681 OHM 1% 1/8W	110-6810
R9-R10	FX MFLM 93.51K 0.5% 1/8W	112-9358
R11-R12	FX MFLM 46.75K 0.5% 1/8W	112-4678
R13-R14	FX MFLM 23.38K 0.5% 1/8W	112-2338
R15-R16	FX MFLM 11.69K 0.5% 1/8W	112-1168
R17-R18	FX MFLM 9.351K 0.5% 1/8W	111-9358
R19-R20	FX MFLM 4.675K 0.5% 1/8W	111-4678
R21-R22	FX MFLM 2.338K 0.5% 1/8W	111-2338
R23-R24	FX MFLM 1.169K 0.5% 1/8W	111-1168
R25	VAR CMT 500 OHM 3/8 SQ FM	118-1503
R26, R28	FX MFLM 20.5 OHM 1% 1/8W	112-2050
R27	RES NET 10K DUAL × 8	128-3103
R30, R56, R82, R83	FX CFLM 10K 5% 1/4W	116-3101
R32, R34, R58, R60, R84, R86	FX MFLM 5.56K 0.5% 1/10W	111-5561
R33	FX MFLM 200K 1% 1/10W	113-2001
R35-R36	FX MFLM 140.5K 0.1% 1/8W	113-1408
R37-R38	FX MFLM 70.27K 0.1% 1/8W	112-7028
R39-R40	FX MFLM 35.13K 0.1% 1/8W	112-3518
R41-R42	FX MFLM 17.57K 0.1% 1/8W	112-1758

PARTS LIST
HIGH PASS FILTER BOARD A3
MODEL 753A
ASSEMBLY NUMBER 004-0753 — 3 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R43-R44	FX MFLM 14.05K 0.1% 1/8W	112-1408
R45-R46	FX MFLM 7.027K 0.1% 1/8W	111-7028
R47-R48	FX MFLM 3.513K 0.1% 1/8W	111-3518
R49-R50	FX MFLM 1.757K 0.1% 1/8W	111-1758
R51, R107, R81	VAR CMT 1.0K 3/8 SQ FM	118-2102
R52	FX MFLM 14.7K 1% 1/10W	112-1471
R53, R79	RESNET 2.20K 1% × 8	128-2223
R54	FX MFLM 4.42K 1% 1/10W	111-4421
R59	FX MFLM 30.5K 1% 1/10W	112-3059
R61-R62	FX MFLM 164.2K 0.1% 1/8W	113-1648
R63-R64	FX MFLM 82.12K 0.1% 1/8W	112-8218
R65-R66	FX MFLM 41.06K 0.1% 1/8W	112-4108
R67-R68	FX MFLM 20.53K 0.1% 1/8W	112-2058
R69-R70	FX MFLM 16.42K 0.1% 1/8W	112-1649
R71-R72	FX MFLM 8.212K 0.1% 1/8W	111-8219
R73-R74	FX MFLM 4.106K 0.1% 1/8W	111-4109
R75-R76	FX MFLM 2.053K 0.1% 1/8W	111-2059
R77	VAR CMT 5.0K 3/8 SQ FM	118-2502
R78	FX MFLM 60.4K 1% 1/10W	112-6041
R80	FX MFLM 3.40K 1% 1/10W	111-3401
R85	FX MFLM 15.4K 1% 1/10W	112-1541
R91, R96	FX CFLM 1.0K 5% 1/4W	116-2101
R92, R94	FX MFLM 3.57K 1% 1/10W	111-3571
R93, R95	FX MFLM 1.00K 1% 1/10W	111-1001
R97, R99	FX CFLM 10 OHM 5% 1/4W	116-0101
R98	FX CFLM 1.0M 5% 1/4W	116-5101
R101	FX MFLM 900K 1% 1/10W	113-9009
R102, R139	FX MFLM 100K 1% 1/10W	113-1001
R103	FX MFLM 2.40K 5% 2W 200 PPM	111-2403
R104, R105	FX MFLM 6.81K 1% 1/10W	111-6811
R106	VAR CMT 1.0K 3/8 SQ EM	118-2101

PARTS LIST
HIGH PASS FILTER BOARD A3
MODEL 753A
ASSEMBLY NUMBER 004-0753 — 4 Of 4

Reference Designator	Part Description	WAVETEK Part Number
R108	FX MFLM 8.98K 1% 1/10W	111-8989
R109	FX MFLM 328 OHM 1% 1/10W	110-3281
R110	FX MFLM 1.37K 1% 1/8W	111-1370
R111, R114, R145	FX MFLM 4.32K 1% 1/10W	111-4321
R112-R113, R137, R143-R144	FX MFLM 2.15K 1% 1/10W	111-2151
R115, R121-R131	FX CFLM 100 OHM 5% 1/4W	116-1101
R132	FX CFLM 4.7 OHM 5% 1/4W	116-9471
R136	FX CFLM 1.0 M 5% 1/4W	116-5101
R138	VAR CMT 100K 3/8 SQ FM 18T	118-4104
R140	FX MFLM 90.9 OHM 1% 1/10W	119-9091
R141	FX MFLM 909 OHM 1% 1/10W	110-9091
R146	FX CFLM 47 OHM 5% 1/4W	116-0471
R147	FX CFLM 82 OHM 5% 1/4W	116-0821
None	JUMPER	353-0104
None	SOCKET: IC 14 PIN DIP ST	353-1403
None	NYLON SNAP BUTTON (MB1-156)	376-2109
TP-1	TERM PIN WW .025 GOLD PLT	354-0003
U1, U3, U5, U7, U11, U13	LIN OP-AMP (LF351N)	120-1017
U2, U4, U6	QUAD LIN OP-AMP SEL (LF347N)	120-2007
U8	ANALOG VOLT COMP (LM339)	120-3339
U9	DUAL MATCHED FET (NPD5566)	138-5566
U10, U14	LIN OP-AMP (NE5534)	120-1018

PARTS LIST
POWER SUPPLY BOARD A1
MODELS 751A, 752A, 753A
Assembly Number 004-0765

Reference Designators	Part Description	WAVETEK Part Number
CR1-CR4	SIL RECT 50 PIV 1A (IN4001)	130-0110
C1, C2	FX ELECT 10,000 UF 15V P.C.	109-9100
C3, C4	FX ELECT 3000 UF 50V P.C.	109-8300
C5, C7, C9, C11-C14	FX TANT 10 UF 20V 20%	109-6100
C6, C8, C10	FX CER .1 UF 50V	100-4102
C15	FX PLYSTY .10 UF 10% 600V	105-4100
C16	FX CER .01 UF GMV 1KV	100-3100
BR1	SIL FWB 100 PIV 5A	130-1440
Q1, Q2, Q3	P.V. REG 3 TERM 5V	120-0053
Q4, Q6	P.V. REG 4 TERM ADJ 500MA	120-0001
Q5, Q7	N.V. REG 4 TERM ADJ 500MA	120-0002
R1	FX CFLM 470 OHM 5% 1/2W	116-1472
R2, R3, R4	FX CFLM 470 OHM 5% 1/4W	116-1471
R5, R8	FX MFLM 10.0K 1% 1/10W	112-1001
R6, R9	FX MFLM 7.30K 1% 1/8W	111-7300
R7, R10	FX MFLM 12.7K 1% 1/10W	112-1271
S2	SLIDE DPDT, 115/230 P.C. MT	342-2203

PARTS LIST
BDC INTERFACE BOARD A4
MODELS 751A, 752A, 753A
Assembly Number 004-0780

Reference Designators	Part Description	WAVETEK Part Number
C1-C13	FX MONO .1 UF 10% 50V	100-4102
J17-J20	HDR 26 PIN DIL RT ANG ST, LK	352-2601
J21	HDR 50 PIN DIL RT ANG ST, LK	352-5002
R1-R10, R13	FX CFLM 10K OHM 5% 1/4W	116-3101
R11-R12	FX CFLM 150 OHM 5% 1/4W	116-1151
TP1 GND	TEST PIN	354-0027
U1-U12	PULL-UP NET 10K 2% × 9 SIP	128-3104
U13-U14	OPTOISOLATOR (TIL112)	120-9112
U15-U30	DUAL PRPHL DRIVER (75451)	120-4451
U31-U34	8 BT LATCH 3-ST (74LS373)	125-0147
U35	HX INVERTER (7406)	122-7406

PARTS LIST
GPIB INTERFACE BOARD A5
MODELS 751A, 752A, 753A
Assembly Number 004-0785 — 1 Of 2

Reference Designators	Part Description	WAVETEK Part Number
C1-C18, C20, C21, C24, C28-C31, C33	FX MONO .1 UF 50V 10%	100-4102
C19, C25, C26, C27	FX MICA DP 470 PF 10% 500V	101-1470
C22	FX MICA DP 5 PF 10% 500V	101-0050
C23	FX MICA DP 47 PF 10% 500V	101-0470
C32	FX TANT 1.0 UF 20% 35V	109-5100
CR1	SL LW LK 70 PIV 200MW (1N457)	132-0457
J23-J26	HEADER HDR 26 PIN DIL RT ANG ST, LK	352-2601
J27	HEADER RT 34 PIN ANG	352-3400
None	MOUNTING BUTTONS (MB1-156)	376-2109
R1, R2	FX CFLM 4.7K OHM 5% 1/4W	116-2471
R3-R6	FX CFLM 470 OHM 5% 1/4W	116-1471
R7	FX CFLM 27K OHM 5% 1/4W	116-3271
R8, R9	FX CFLM 150 OHM 5% 1/4W	116-1151
None	SOCKET: IC 28 PIN DIP ST	353-2800
TP1, TP2	TEST PIN	354-0027
U1-U15	DUAL PRPHL DRIVER (75451)	120-4451
U16-U22, U51	PULL UP NET 10K 2% × 10 SIP	128-3104
U23, U25, U28, U29	8 BIT LATCH 3-ST (74LS373)	125-0147
U24, U27, U31-U32, U34, U36-U38, U48	QUAD D FLIP FLOP (74LS175)	125-0110
U26, U30	BCD TO DECIMAL DECODER	125-7442
U33, U35, U56	QUAD 2 IN AND GATE	125-7408
U39	DL MNSTBL MVBTR (74123)	122-0107
U40	HEX INVERTER	125-7404
U41, U43	DL 2 TO 4 LN DECOD (74LS139)	125-0116
U42	QUAD 2 IN OR GATE	125-7432
U44	QUAD 2 IN OR NAND GATE	125-7400
U45	DUAL TYPE D FLIP FLOP	125-7474
U46	5 BIT COMPARATOR (9324)	122-9324

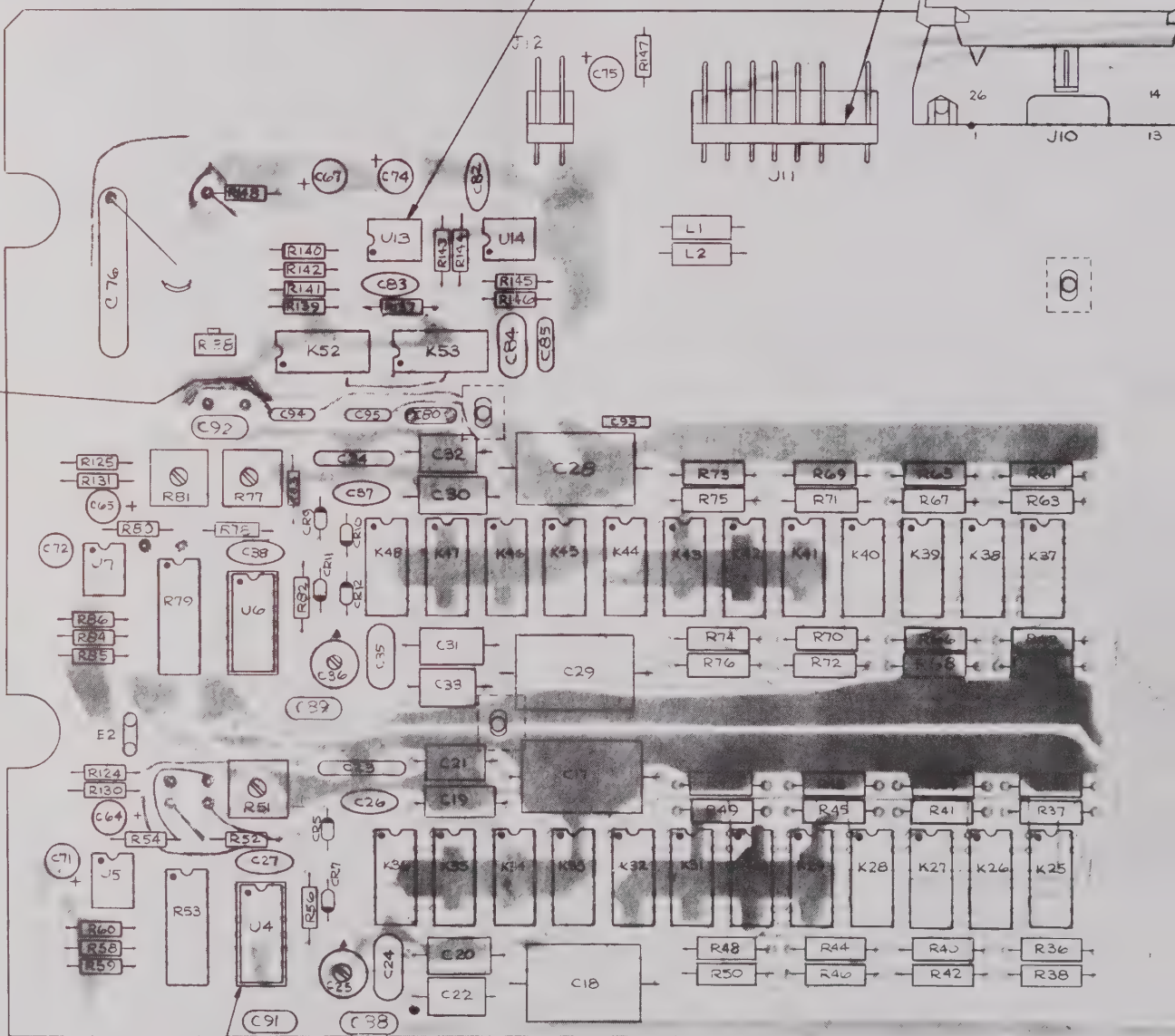
PARTS LIST
GPIB INTERFACE BOARD A5
MODELS 751A, 752A, 753A
ASSEMBLY NUMBER 004-0785 — 2 Of 2

Reference Designators	Part Description	WAVETEK Part Number
U47	FPLA: PGMD 751/752/753	022-0004
U49	TRIPLE 3 IN NAND GATE	125-7410
U50	QUAD 2 IN NOR GATE	125-7402
U52-U55	IEEE BUS DRIVER (MC3448AL)	120-4448
U57	QUAD 2 IN NAND BUFFER	125-7437

PIN#8
 LF357 (U13) WHEN MOUNTING
 MAKE SURE PIN#1 GOES IN
 PIN#1 HOLE DENOTED WITH
 DOT. PIN#8 IS TAP GOES IN
 PIN#8 HOLE.
 PIN#1

REMOVE PIN 7 FROM CONNECTOR

SEE NOTE N°1



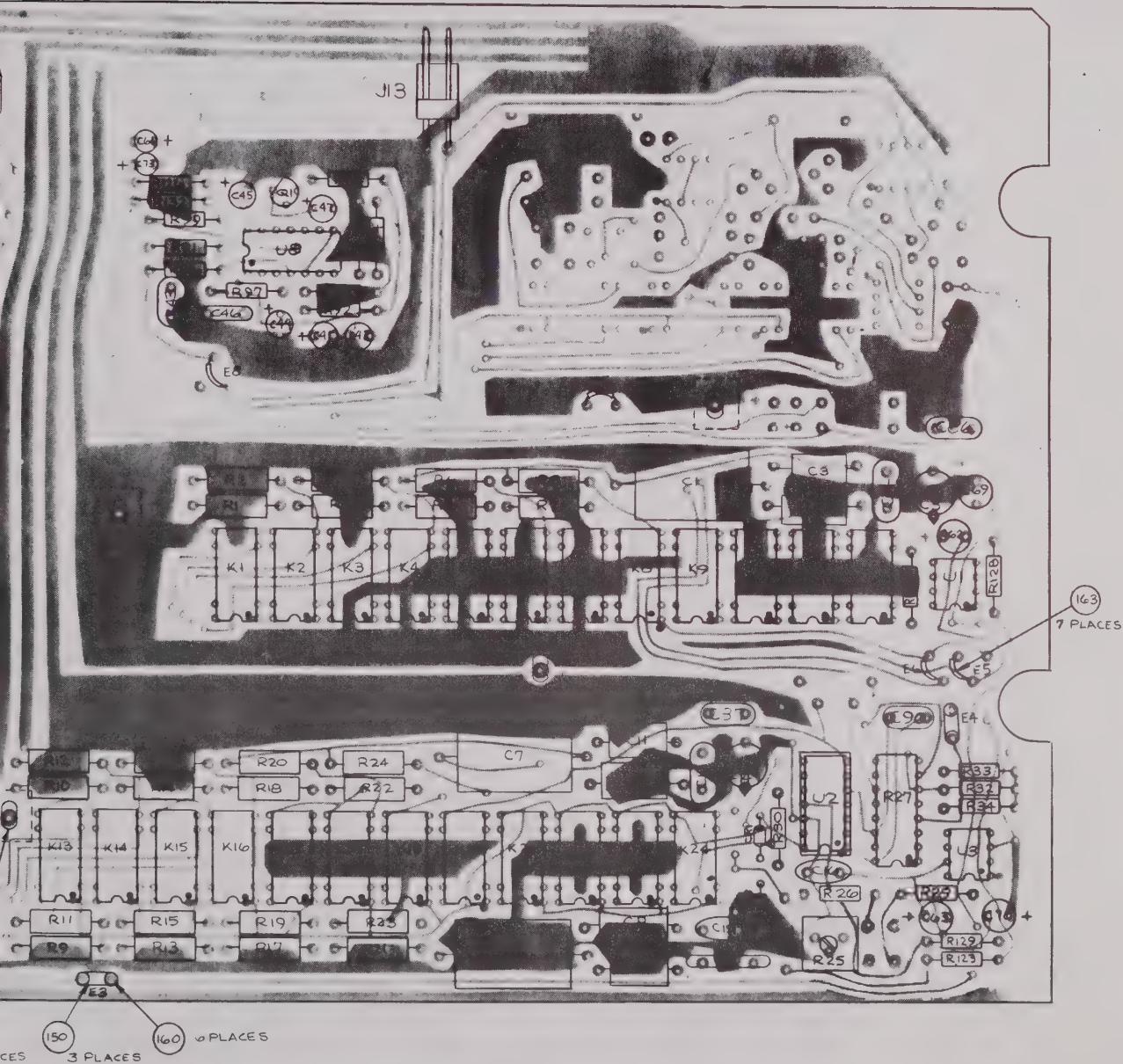
SEE NOTE N°2

160 3 PLACES

NOTES:

1. C93, C94 & C95 ARE SELECTED AND INSTALLED IN TEST.
2. U2, U4, & U6 ARE MOUNTED IN SOCKETS

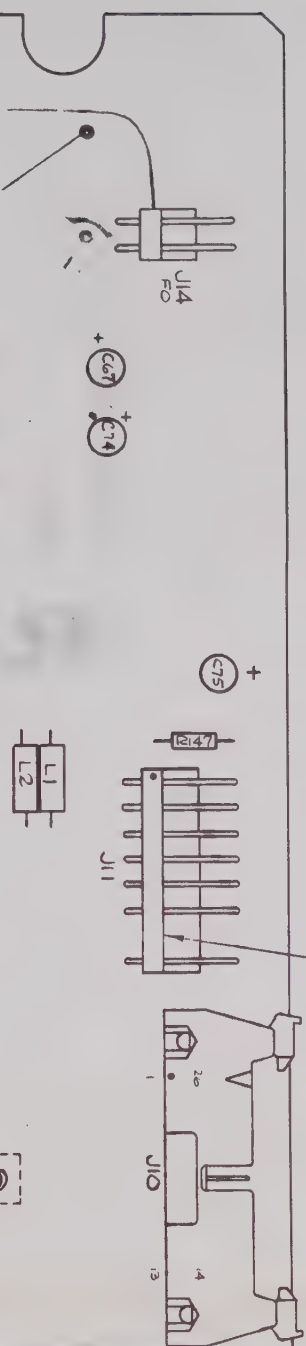
LTR	ECO NO.	CHANGED BY	APP'D BY	DATE
A	RELEASE		Sh	6-6-79
B	07	8-1-79	Sh	8-1-79
C	1074	JB 12-4-79	Sh	12-4-79
D	1096/1105	FZ	Sh	12-15-79



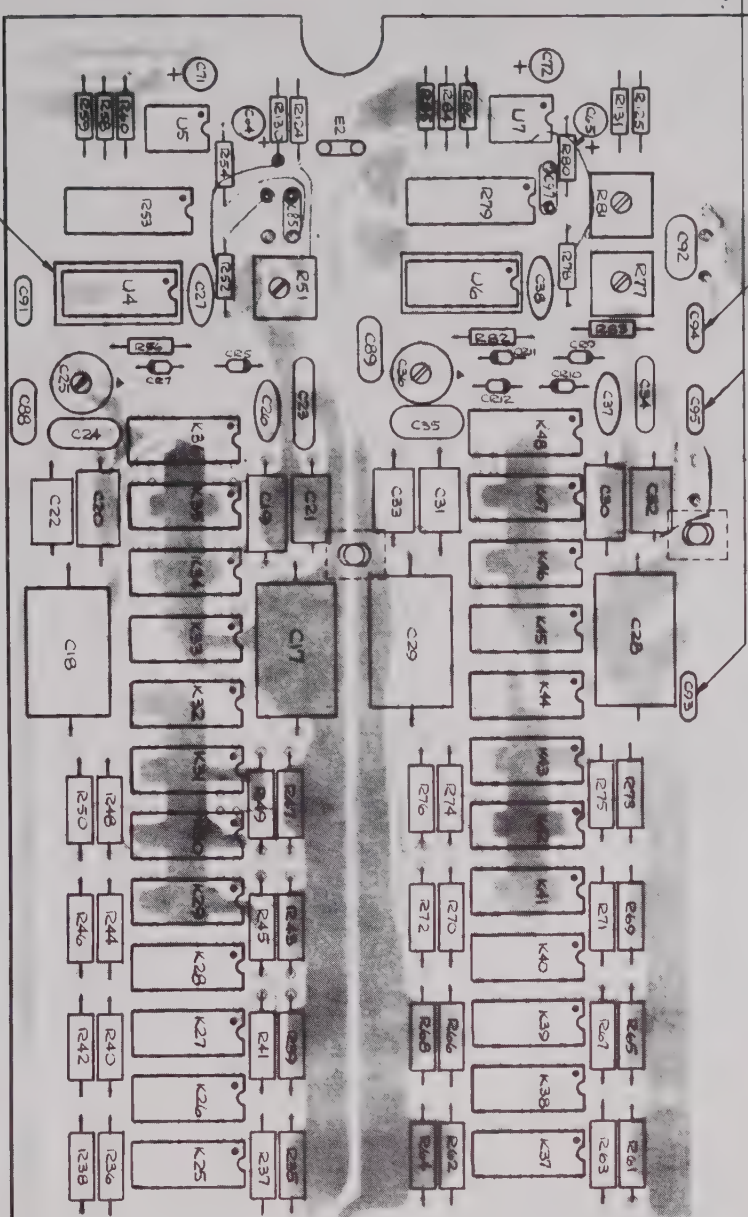
SHEETS 2-6 ARE A SIZE L/M.

DRAWN BY M. MCINN		DATE 8-26-79		ROCKLAND Rockland Systems Corporation	
CHECKED BY:					
ENG APPV. Sh		Sh		Confidential property of ROCKLAND SYSTEMS CORP not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above.	
MFG APPV. Louis A. Tava		Sh			
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE .XXX ± .005 .XX ± .01 .X ± .04 L ± .1				TITLE ASSEMBLY 751A LP FILTER BOARD	
SIZE D		DRAWING NO. 02-004-0755		REV. D	
SCALE 2:1		SHEET 1 OF 6			

LYR	ECO NO	QUANTITY	BY	APPROV BY	DATE
A	RELEASE				
B	069	7/27/77			8/7/77
C	1074	JB 12479			8/7/77
D	1105	EA11978			8/7/77
E	1150	TC 11508			8/7/77
F	1197	JD 731/81			8/7/77
G	1283	HIGHMAN			8/7/77



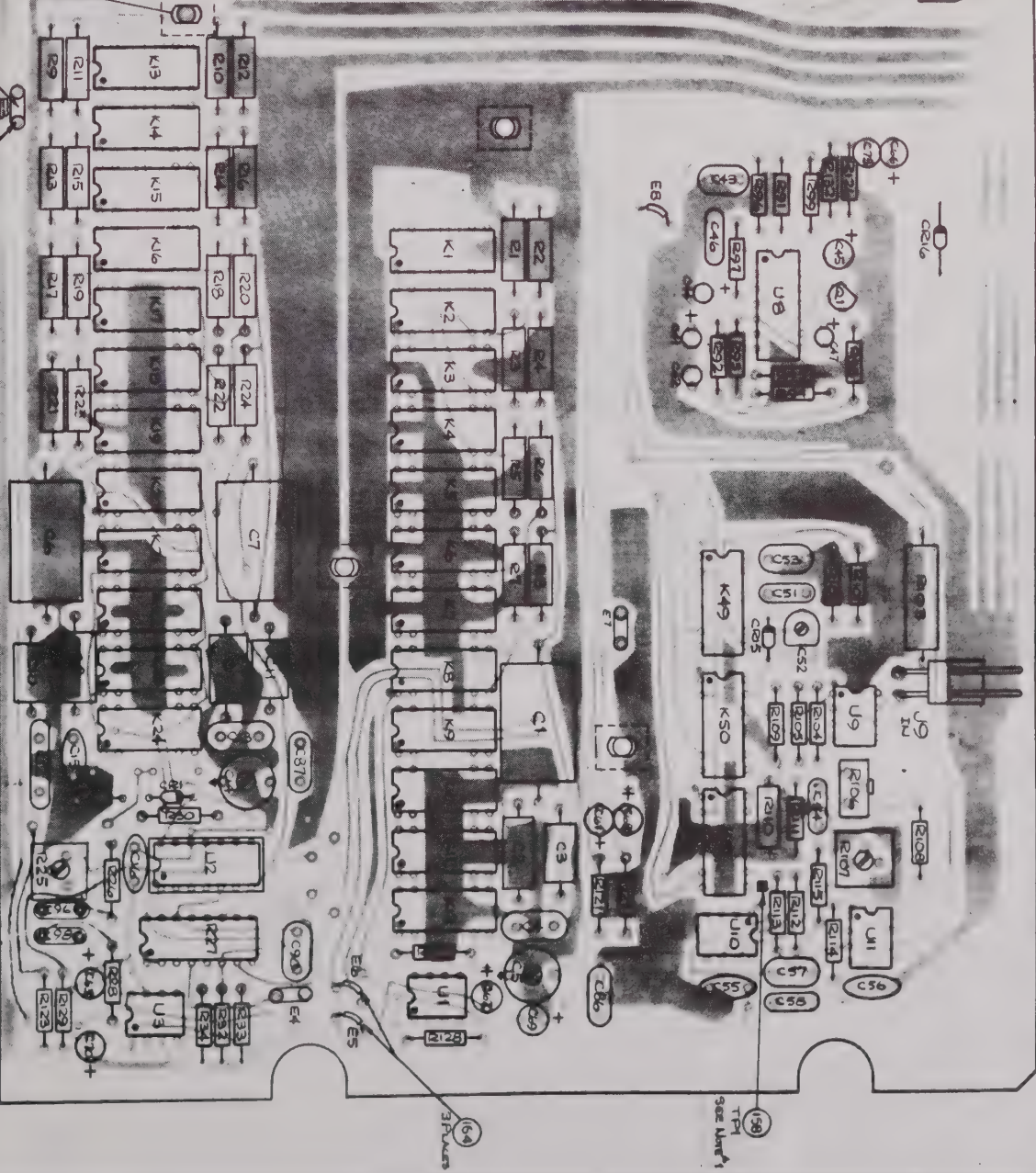
SEE NOTE #3.



162
3 PLACES
SEE NOTE #2.

160
153
159
1 PLACES
4 PLACES
8 PLACES

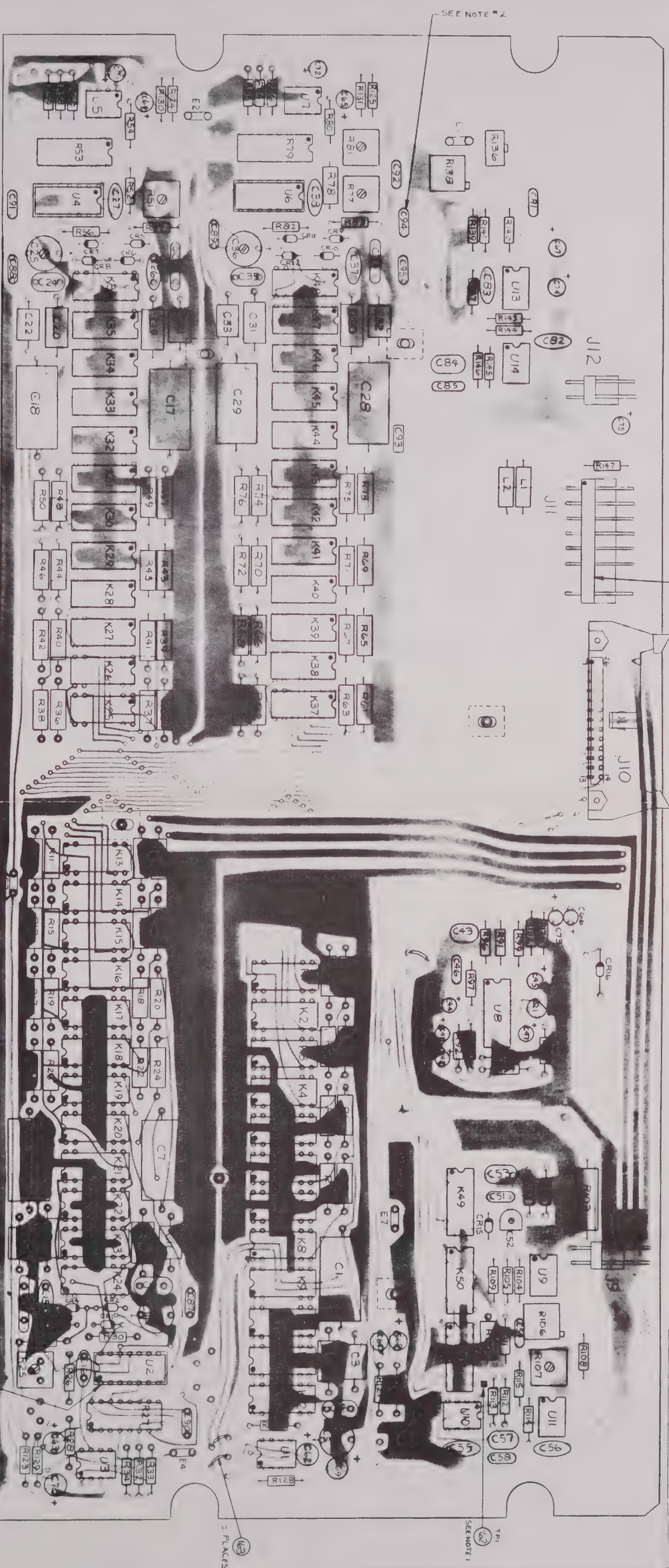
NOTES:
1-CUT TEST POINT TO MAX. HEIGHT OF 3/8".
2-U2,U4,U6 ARE MOUNTED IN SOCKETS.
ITEM# 162.
3-C93,C94,C95 ARE TO BE SELECTED & INSTALLED IN THE TEST STAGE.



DESIGNED BY	JB	DATE	12/77
CHECKED BY		DATE	12/77
END APPR. BY	BK	DATE	5/1/78
TEST APPR. BY	7/1/78	DATE	7/1/78
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE: MAX ± .015 MIN ± .01 HOLE ± .004 D ± .01			
ROCKLAND Rockland Systems Corporation Confidential property of ROCKLAND SYSTEMS CORP. not to be disclosed to others, reproduced or used for any purpose except as authorized in writing by above. TITLE ASSEMBLY 751A HP FILTER BOARD			
SIZE	DRAWING NO		
D	02-004-0760		
SCALE	2:1	REV	6

ITEM	ECO NO.	CHANGED BY	APPROVED BY	DATE
A	RELEASE			
B	1002	MCMHUN	N. (A. 3.8.7)	
C	1040	MCMHUN	244	
D	1074	1074	1074	
E	1105	341478	444	
F	1144	444	444	

SEE BELOW



- NOTE.
1. CUT TEST POINT PIN TO A MAX HEIGHT OF 3/8"
 2. C93, C94 & C95 ARE TO BE SELECTED AND INSTALLED IN TEST STAGE.

ITEM	ECO NO.	CHANGED BY	APPROVED BY	DATE
H	1150	TC 12-15-80	244	1/1/81
J	1189-1189A	TC 3-5-81	244	6-9-81

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UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN
INCHES AFTER FINISHING
AND TOLERANCES ARE

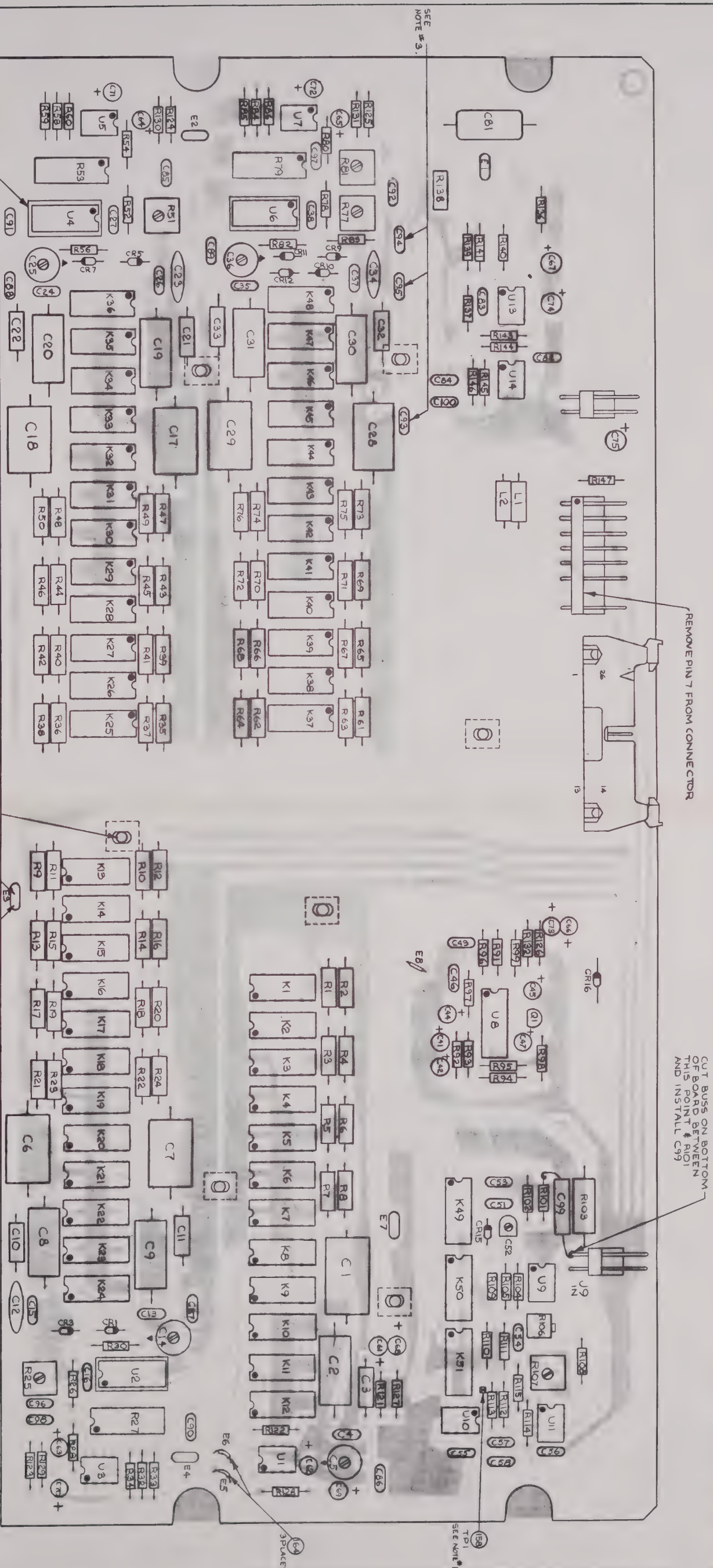
XXX ± .015
XX ± .01
X ± .005
± .001

SIZE
D 02-004-0750

SCALE 2 1 6

REV J

ZONE	LTR	ECO NO	CHANGED BY	APPRD BY	DATE
	A	RELEASE			
	B	1394	NP 8/18/02	26	8/18/02



REMOVE PIN 7 FROM CONNECTOR

SEE
NOTE # 3

3 PLACES
SEE NOTE 2

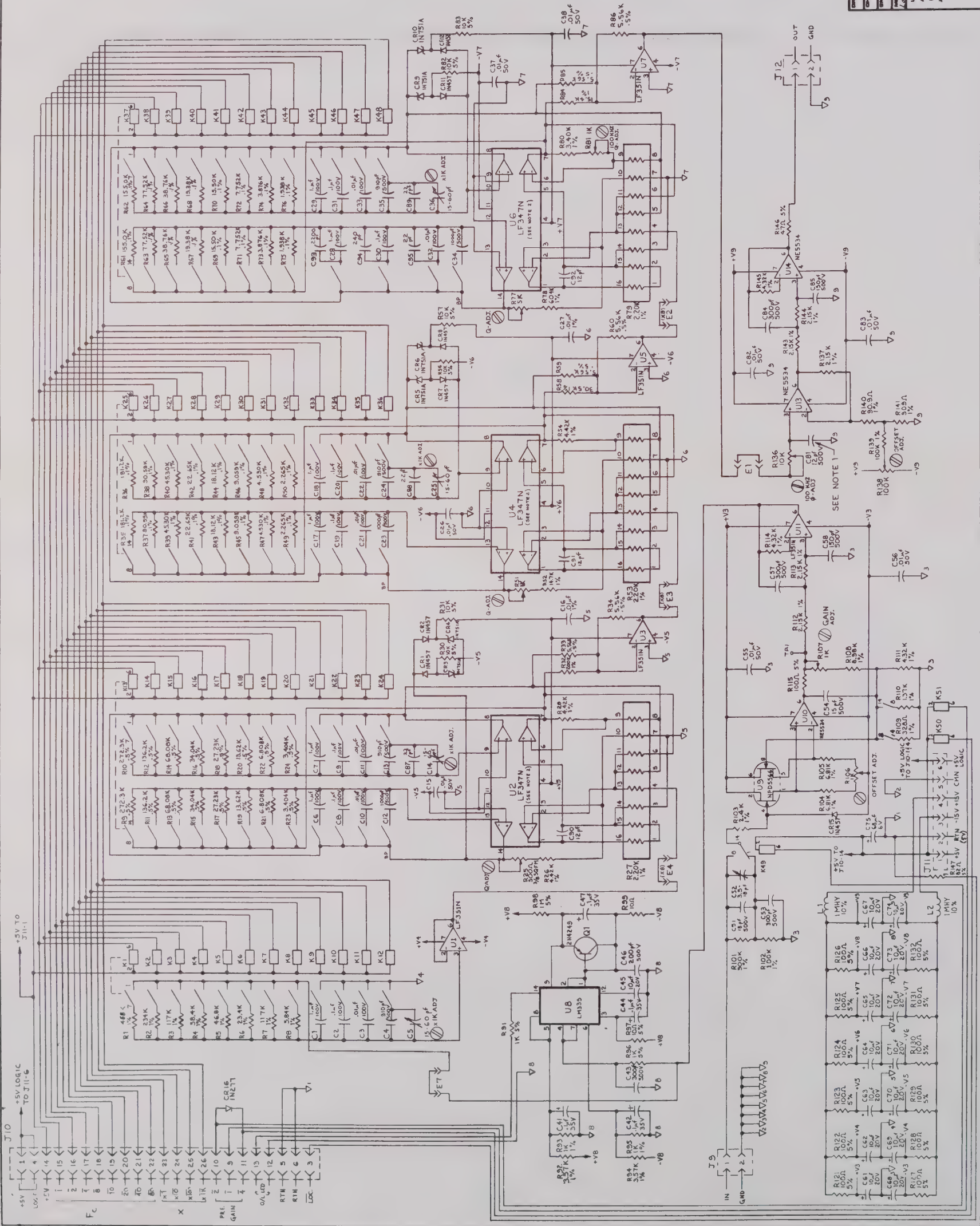
7 PLACES 5 PLACES 10 PLACES

NOTES:
1-CUT TEST POINT TO MAX. HEIGHT OF 3/8".
2-102,104,106 ARE MOUNTED IN SOCKETS.
ITEM #162.
9-C98,C99,C95 ARE TO BE SELECTED
INSTALLED IN THE TEST STAGE

DATE	J.P.	DATE 3-15-83
ENG	~~W.H.~~	3/24/83
END		3/25/83
WFG	W.H.	3-22-83
ISSUED		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE		
	± .01	± .1
WGT	2.105	
FIN		

WAVETEK ROCKLAND		Wavetek Rockland Inc.	
ASSEMBLY 753A HP FILTER BOARD			
SIZE	WGT. NO.	GRADING NO.	REV
D	753A	02-004-0753	B
SCALE	2:1	23338	SHEET 1 OF 6

LYR	REQ NO.	CHANGED BY	APPROV BY	DATE
A	1002	M. McMINN		7-14-74
B	1002	B. THOMAS		7-14-74
C	1012	T.H. 8-7-74		8-9-74
D	1012	SA		10-1-74



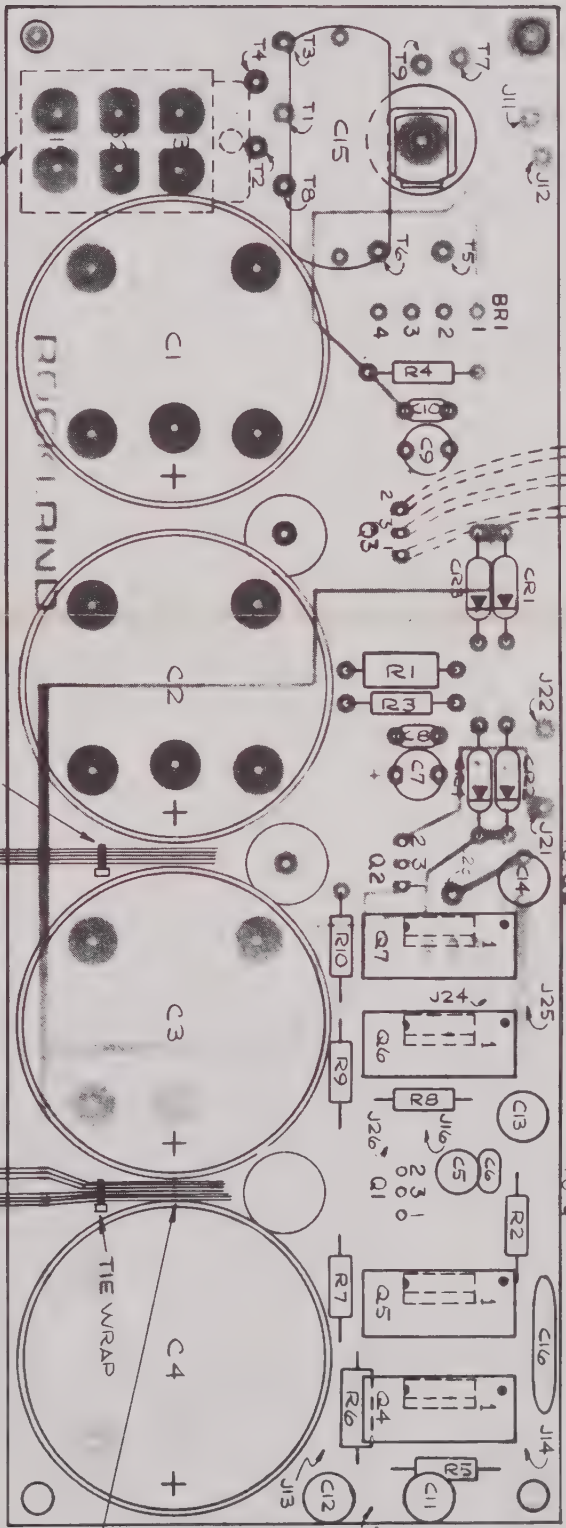
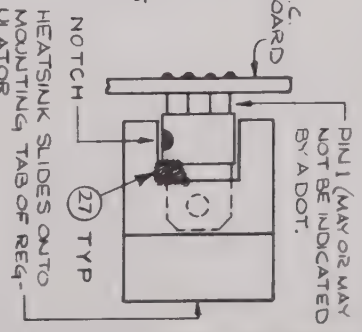
- NOTES:
1. C81 IS A 12 μ F CAP (NOMINAL) INSTALLED IN PRODUCTION. TEST WILL SELECT NEW CAP VALUE IF REQUIRED.
 2. LF347N SELECTED IN TEST.
 3. C93, C94, C95 SELECTED IN TEST.
 4. CONNS J13 & J14 ARE NOT USED ON THIS OPTION.

DATE	BY	CHKD	APP'D	REV
7/14/74	M. McMINN			1
7/14/74	B. THOMAS			2
7/14/74	T.H. 8-7-74			3
7/14/74	SA			4

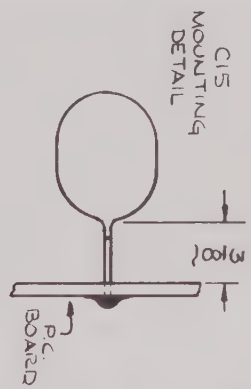
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TITLE	752 MAIN BOARD ASSEMBLY
SCHEMATIC DIAGRAM	
REV	D 03 004 0750
SCALE	NONE
DATE	7-20

LTR	ECO NO.	CHANGED BY	APPROV BY	DATE
A	RELEASE			11-2-79
B	1105	SMY 4780	OK	7-10-80
C	1403	M. McManis	OK	
D	1442	MP 8/14/82	OK	
E	1619	DC 4/19/83	OK	5/3/83
F	1664	OK 4/17/84	OK	8/17/84

Q4, Q5, Q6, Q7 MOUNTING AND HEATSINK DETAIL.

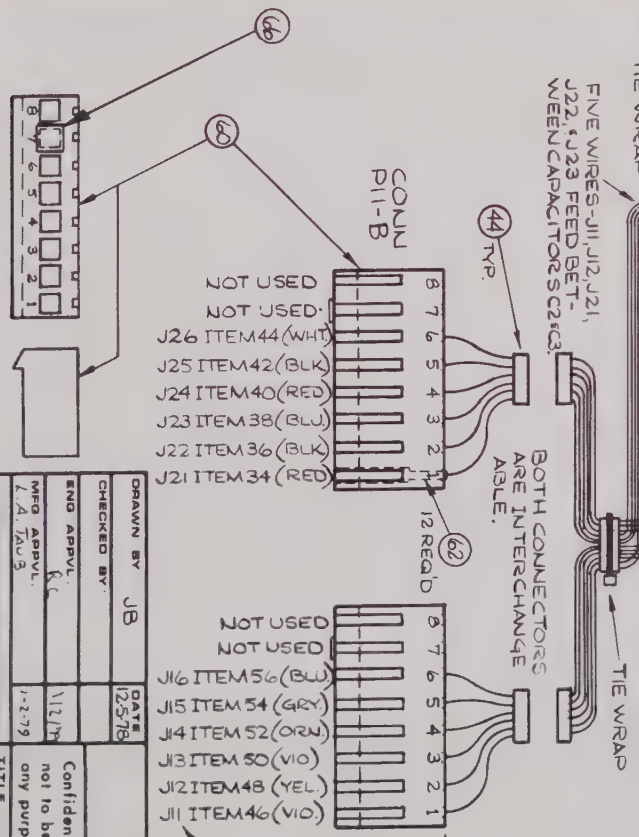


SWITCH S2 MOUNTED ON FARSIDE OF P.C. BOARD CUT OFF BOTTOM MOUNTING FLANGE, AS SHOWN.



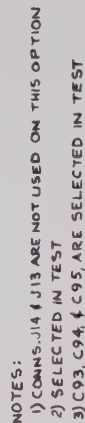
NOTE

ITEMS 29, 31, 33 TO BE SOLDERED TO Q1, Q2 & Q3 ON BOTTOM (SOLDER SIDE) OF BOARD, AS INDICATED.



WIRE CONNECTIONS OF CONN'S P11-A OR P11-B TO J11-J16 & J21-J26, LOCATED ON P.C. BOARD. SHEETS 213 ARE A SIZE 1/4M.

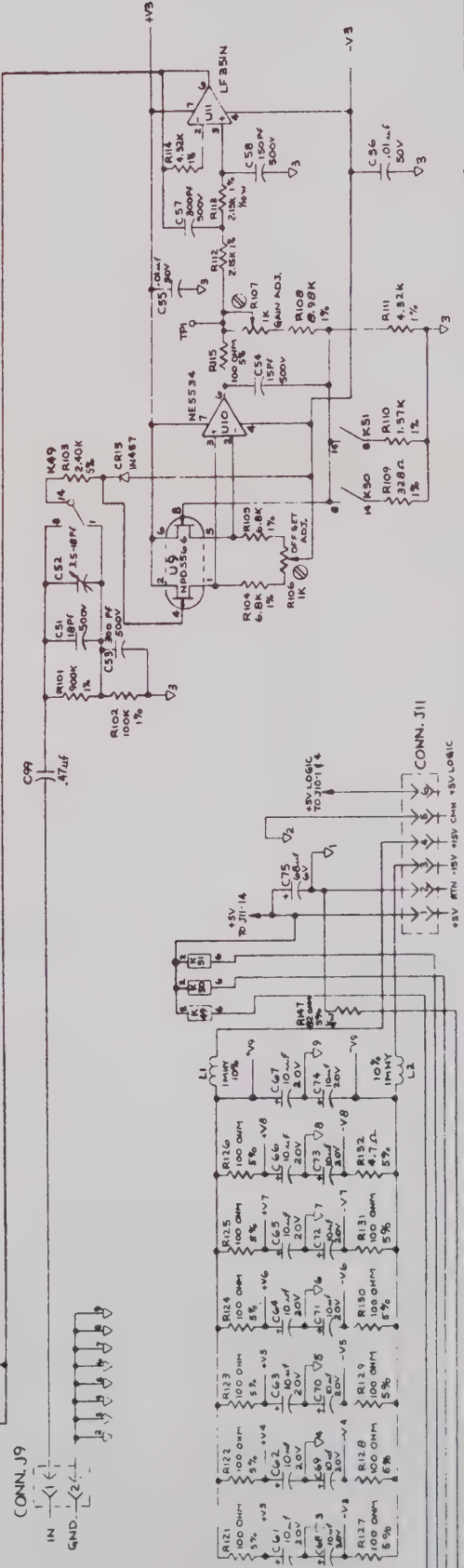
DRAWN BY JB		DATE 12-5-78
CHECKED BY		
END APPL.		11/2/79
MFG APPL.		1-2-79
L.A. TAVES		
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AFTER FINISHING AND TOLERANCES ARE .XXX ± .005 .XX ± .01 X/X ± 1/64 ° ± 1°		
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TITLE POWER SUPPLY ASSEMBLY 751,752,753		
SIZE C	DRAWING NO 02-004-0765	REV F
SCALE 2:1	SHEET 1 OF 3	



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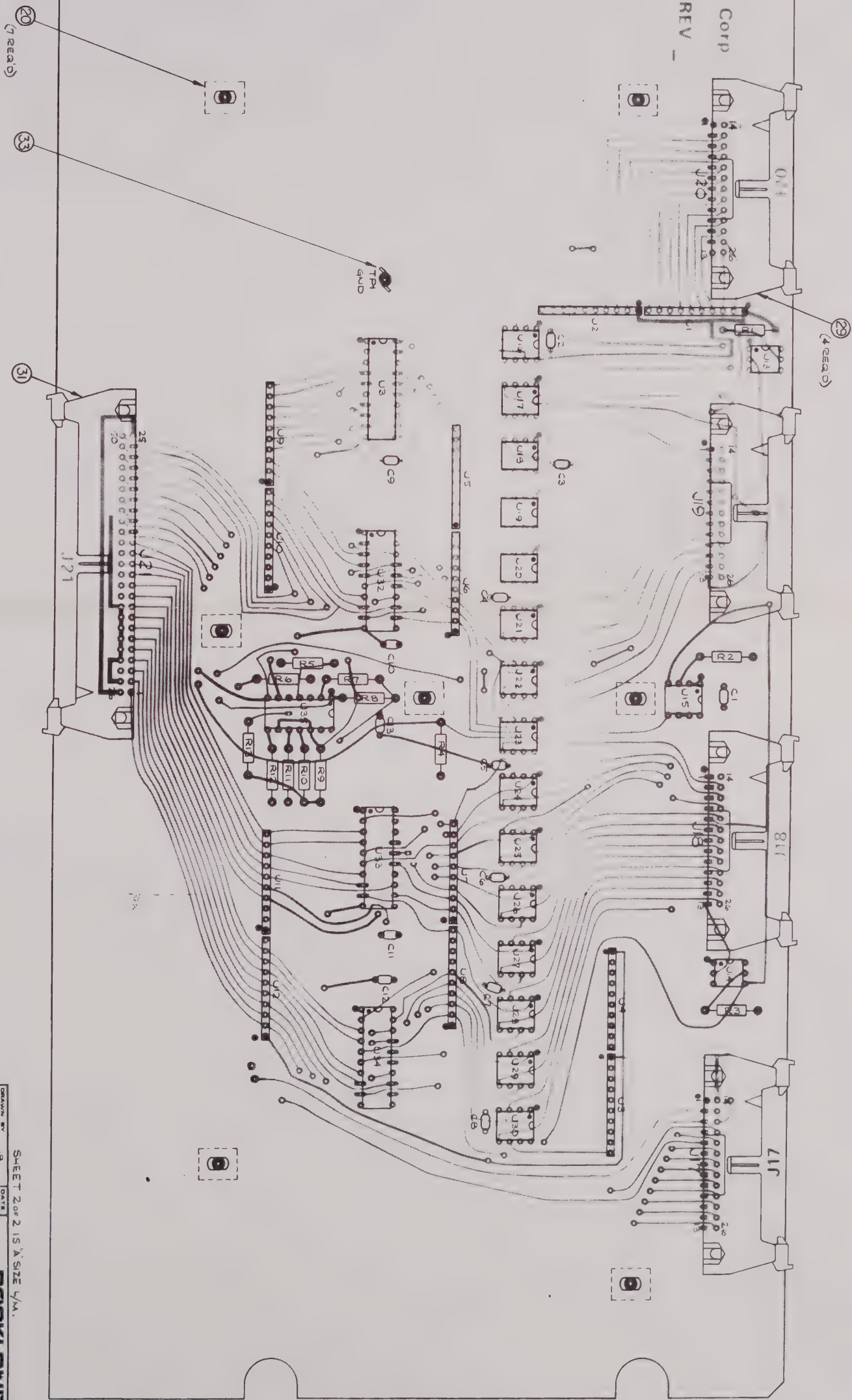
ELEG. SCHEM.
753AHP MAN-ARD

03	004	0753	A
SCALE	IN	0-005	DP
DRAWING NO			



LT#	ECO NO	CHANGED BY	APPROV BY	DATE
A	1	1	1	1
B	1	1	1	1

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ASSY 004-0780 REV -



SHEET 2 OF 2 IS A SIZE Y/A.

DESIGNED BY	JB	DATE	11/5/78
CHECKED BY			
BYO APPROV			
WFO APPROV			
UNLESS OTHERWISE SPECIFIED			
ALL DIMENSIONS ARE IN			
INCHES AFTER FINISHING			
AND TOLERANCES ARE			
XXX ± .005			
XX ± .01			
X/4 ± 1/64			
2° ± 1°			
SIZE	D	QUANTITY	1
02-004-0780			
SCALE	2:1	DRAWN	1
REV	B		

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751/752 BCD INTERFACE
PCB ASSY.

LYR	ECO NO.	CHANGED BY	APPROV BY	DATE
A	RELEASE		RAC	3/3/79
B	1026	MUMMIN	GA	3/3/79

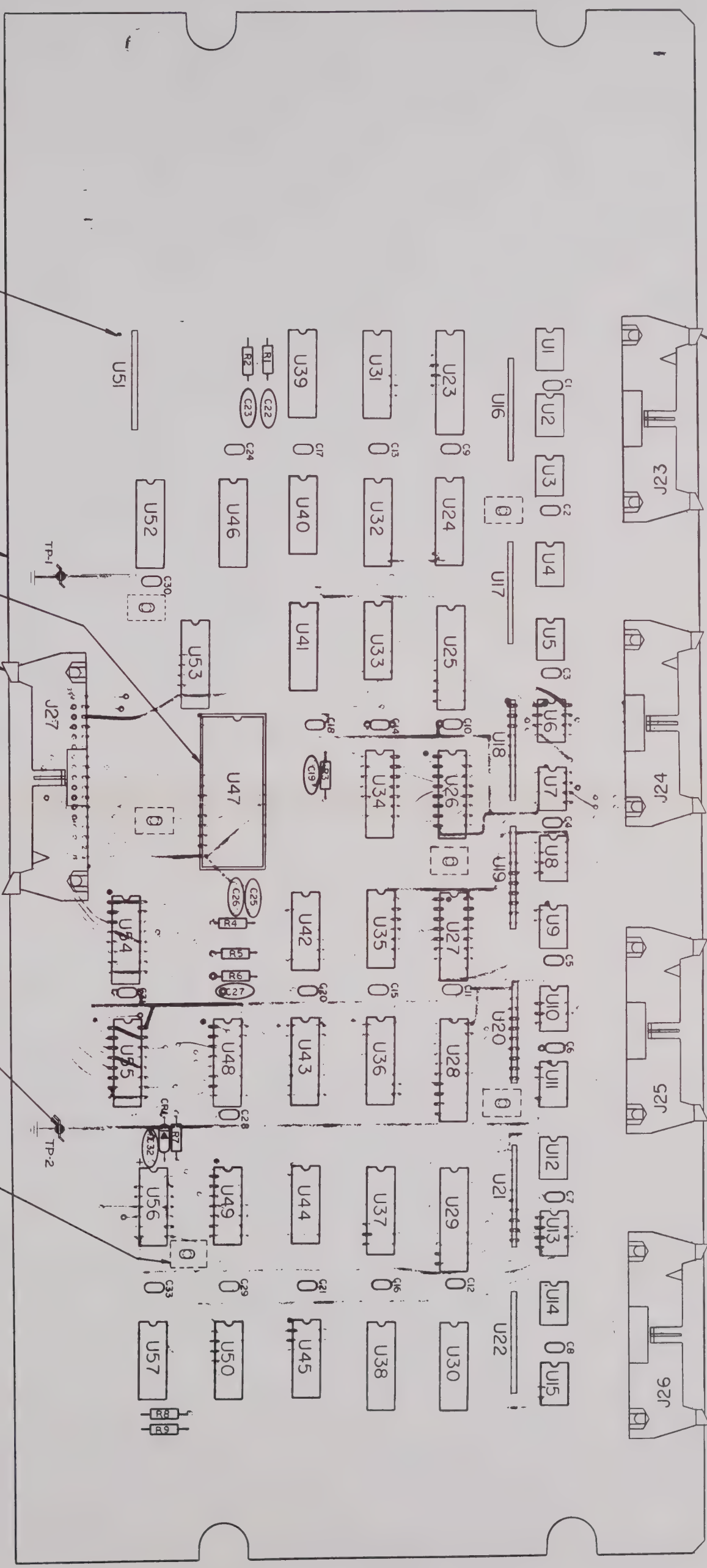
3 TYP (4 PLACES)
 32R
 42R
 52R
 92R

1 64 5

66 2 READ

62 TYP (6 PLACES)

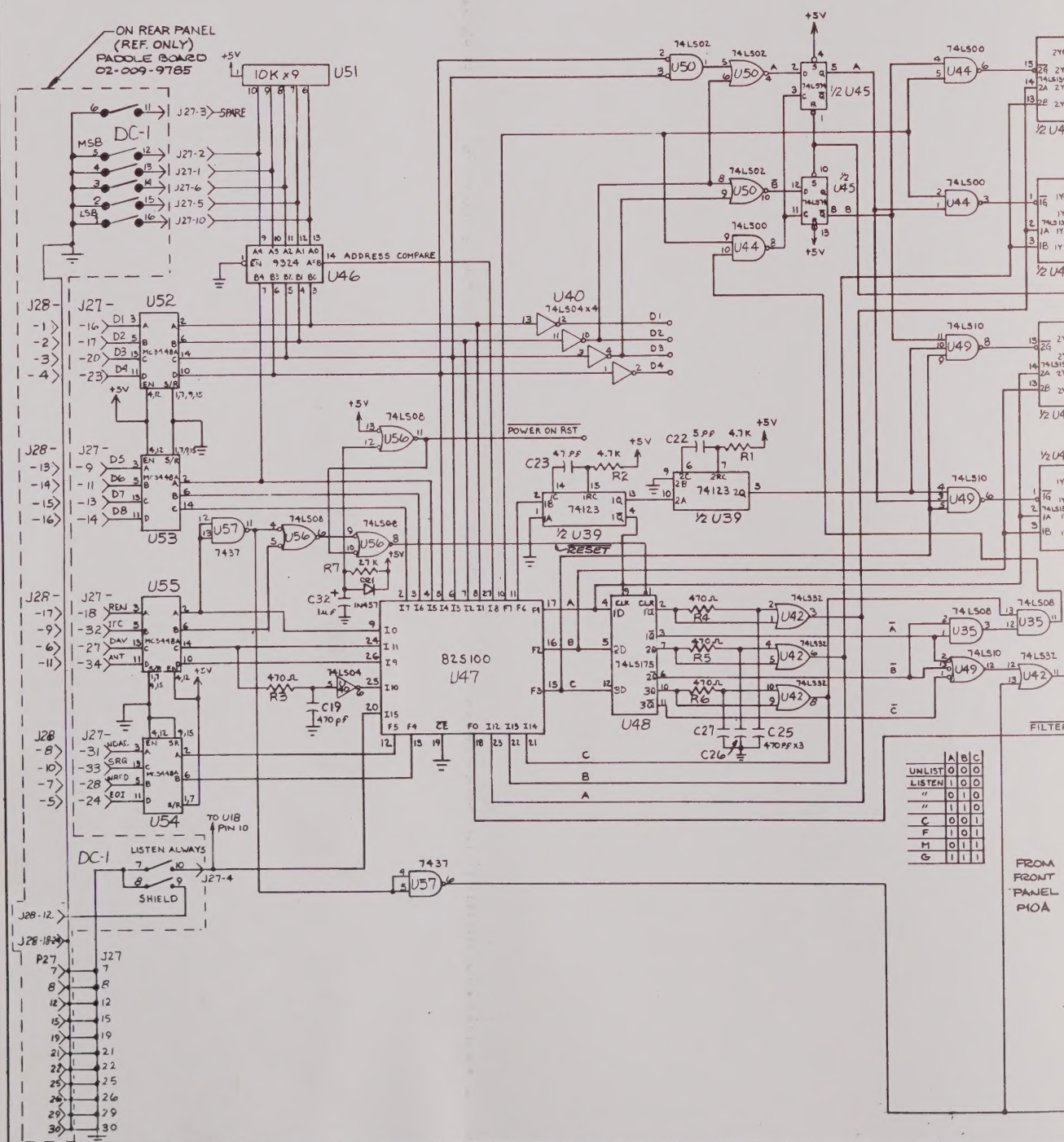
DOT DENOTES PIN N21
 (TYP ALL ICS)

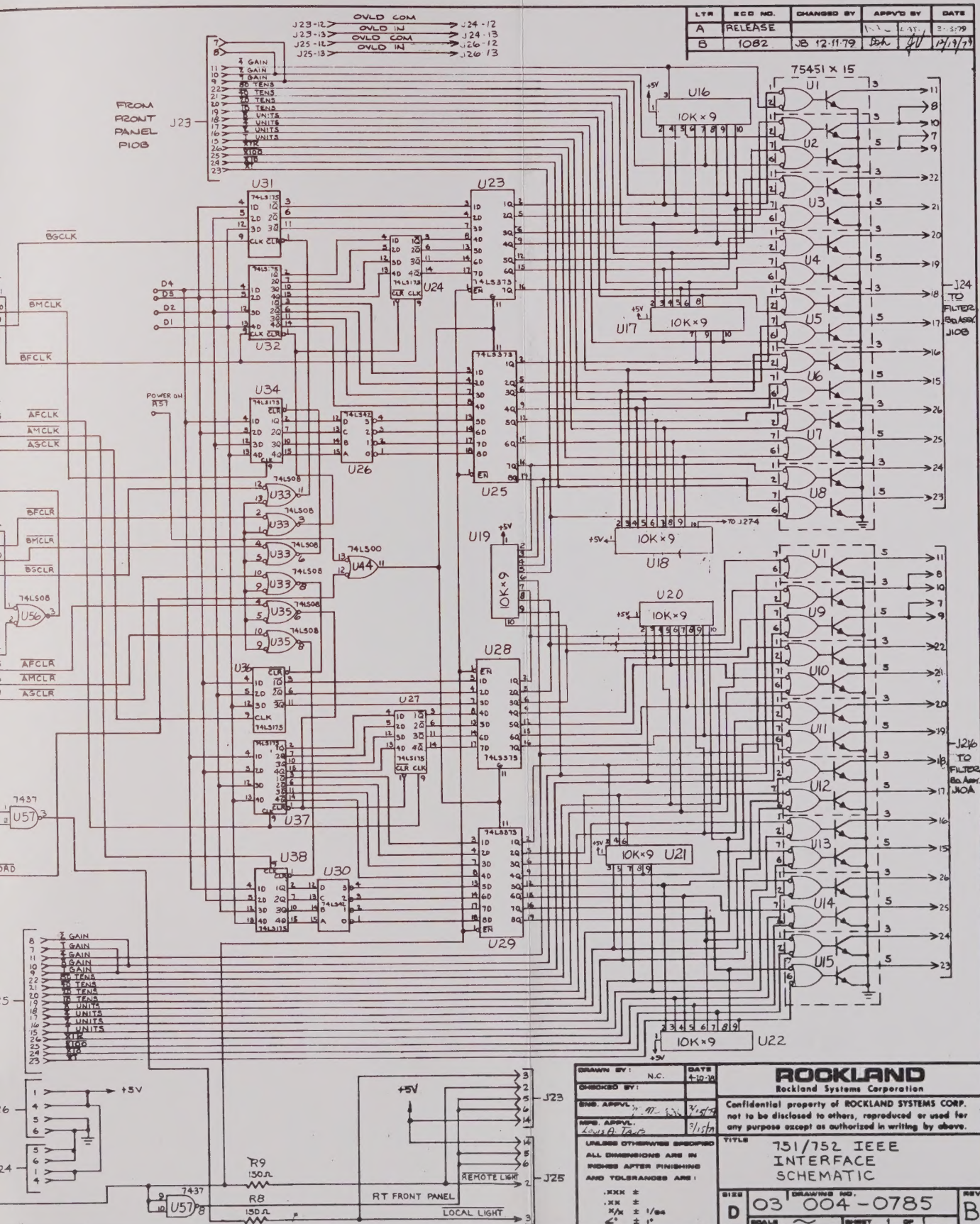


DRAWN BY MUMMIN		DATE 1/2/79
CHECKED BY RAC		DATE 3/3/79
DESIGNED BY RAC		DATE 3/3/79
TITLE ASSEMBLY 751/752 IEEE INTERFACE		SCALE 21
SIZE D 02 004 0785		REV B

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 .XXX ± .015
 .XX ± .01
 .X ± .005
 .0 ± .001





LTR	ECO NO.	CHANGED BY	APP'D BY	DATE
A	RELEASE			2-5-79
B	1082	JB 12-11-79	Isa	12/9/79

DRAWN BY: N.C.

CHECKED BY:

ENG. APPL. 11-11-79

MFG. APPL. Louis A. Tava

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.XXX ±

.XX ±

.X ± 1/64

1/16 ± 1/64

DATE 4-10-79

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SCALE 1 OF 1

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